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The MONTHLY REVIEW

Published by the

American Electro-Platers' Society

A SOCIETY FOR THE ADVANCEMENT
OF THE
SCIENCE OF ELECTRO-PLATING

NOVEMBER, 1934 Subscription $3.00 a year

Entered as second class matter at the Post Office at Springfield, Mass., September 8, 1930, under Act of August 24, 1912.

Acceptance for mailing at special rate of postage, provided for in section 1103, Act of February 28, 1925, authorized September 3, 1926.

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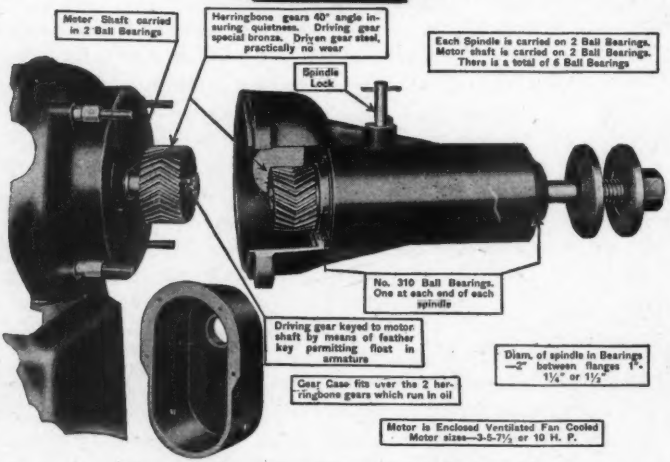
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The MONTHLY REVIEW

Published by the
AMERICAN ELECTRO-PLATERS' SOCIETY

Publication and Editorial Office
90 Maynard St.
Springfield, Massachusetts

VOL. XXI NOVEMBER, 1934 NO. 4

EDITORIAL
THE SEPTEMBER MEETING IN NEW YORK

ON another page of this issue of the MONTHLY REVIEW we publish a summary of the proceedings of the recent electro-platers conference held in New York, Sept. 26, 1934.

Some of the subjects discussed at the meetings were the plating of cadmium and zinc on iron and steel, depositing nickel and chrome on non-ferrous metals and other subjects of great importance to the plating industry.

We particularly desire to call the attention of our readers to the manufacturing concerns represented at this gathering. Chrysler Corp., The Packard Motor Car Co., Doehler Die Castings Co., New Jersey Zinc Co., Ternstedt Co., General Elec. Co., Frigidaire Corp., National Cash Register, International Nickel, United Chrome Corp, American Brass, Chase Brass, American Chain and many others including of course Dr. Blum and our own research associate, Mr. Strausser, from the Bureau of Standards and George B. Hogaboom, representing the Hanson Van Winkle Munning Co.

This meeting was so important that three sessions were held, the closing session lasting until after 10 P. M. The results of meetings such as these point only in one direction - the intense interest shown by our large industrial firms in the work of our organization. The response of the A.E.S. in assuming the obligations upon us cannot be minimized. If these great manufacturing leaders have confidence in us we must not fail. In this connection it might be well to state that since the Detroit Convention the A.E.S. has taken on a new lease of life. We have cast aside "that feeling of uncertainty," and are now ready to meet the challenge which a new industrial era has thrust upon us, and there is every indication that we will succeed.

Our branches are making strenuous efforts to build up the ranks

depleted by the depression and are having good results. Our financial condition is sound. The Research dept. can go forward this year unhampered as in other years by lack of funds. The committees appointed by our President Mr. Gilberston are on the job, and encouraging reports of increased interest in our branch meetings are being sent us by the local Secretaries. Under circumstances such as these, we should show a large increase in membership, and have a proud record of achievement when we meet at Bridgeport in 1935 to render an account of our stewardship having assumed the responsibilities and obligations which changed conditions in industry make it imperative for us to accept.

SUMMARY
CONFERENCE ON ELECTROPLATING IN NEW YORK CITY, SEPTEMBER 26, 1934.

I. INTRODUCTION

THIS conference was held under the auspices of those committees of the American Electro-Platers' Society and the American Society for Testing Materials that are directly interested in researches on electroplating and in specifications based upon the results. The meetings were open to all interested persons, of whom about 40 were present. W. M. Phillips, Chairman of the Research Committee of the American Electro-Platers' Society presided, and W. Blum served as secretary. No stenographic report was made, but notes were kept of the recommendations, in some cases based on informal voting. The conclusions regarding the specifications for plating on steel and the program for exposure tests on non-ferrous metals will be incorporated so far as practicable into revised drafts that will be again circulated for comment. The purpose of this brief report is to indicate the scope and trend of the discussions.

II. SPECIFICATIONS FOR PLATING ON STEEL

1. *Nickel and Chromium Coatings.* Two grades of plating were considered. Special emphasis was placed on the minimum thickness on significant surfaces, though requirements for the average thickness of copper plus nickel were retained. Details regarding the number of specimens for sampling, testing, and rejection were left to mutual agreement. It was recommended that the salt spray test should be conducted at a controlled

temperature, and that failure should be defined in terms of the number and size of the rust spots.

2. *Zinc and Cadmium Coatings.* It was agreed that separate specifications should be prepared for zinc and cadmium coatings, with two grades of each. It was decided to specify only the minimum and not the average thickness of zinc or cadmium. It was reported that very promising "drop tests" for both zinc and cadmium are available, and will soon be published for trial and comment. Further tests were recommended to determine whether an accelerated test, such as the salt spray, is of value in testing zinc and cadmium coatings, of which the minimum thickness can be readily determined. It is believed by some persons that this test may detect imperfect plating, for example where the required thickness of zinc or cadmium is plated over scale or oxide on the steel.

III. PLATING ON NON-FERROUS METALS

There was general agreement upon the desirability of the program as outlined. Several additional base metals were suggested, including spring steel, gray cast iron and malleable cast iron, and high and low brass, both rolled and cast, and possibly aluminum. An effort will be made to include these with the other materials if space is available.

The details regarding the form and preparation of the zinc-base die castings were referred to a special committee, consisting of

W. M. Pierce, Chairman, New Jersey Zinc Co., Palmerton, Pa.
J. C. Fox, Doehler Die Casting Co., Toledo, Ohio.
C. F. Nixon, Ternstedt Manufacturing Co., Detroit, Michigan.
Carl Huessner, Chrysler Corporation, Detroit, Michigan.

IV. FUTURE PLANS

As mentioned above, the revised specifications and program will be circulated as soon as possible to those interested. In the meantime certain assured phases of the work will be initiated. The Research Committee of the American Electro-Platers' Society is now engaged in a campaign to raise $5000 per year for two years for the salary of the Research Associate and other expenses of the investigation. Inquiries regarding this fund should be sent to the Chairman, W. M. Phillips, General Motors Corporation, Detroit, Michigan, or to the Secretary-Treasurer,

Walter Fraine, 507 Grand Ave., Dayton, Ohio. Inquiries regarding details of the specifications or of the new program should be sent to W. Blum, Bureau of Standards, Washington, D. C.

LIST OF THOSE PRESENT AT THE CONFERENCE

E. A. Anderson, New Jersey Zinc Co., Palmerton, Pa.
Edwin M. Baker, University of Michigan, Ann Arbor, Michigan.
W. Blum, Bureau of Standards, Washington, D. C.
Adolph Bregman, Metal Industry, New York City.
E. T. Candee, American Brass Co., Waterbury, Conn.
Chas. C. Conley, National Cash Register Co., Dayton, Ohio.
T. G. Coyle, United Chromium, Incorporated, Detroit, Michigan.
Walter Fraine, National Cash Register Co., Dayton, Ohio.
O. B. J. Fraser, International Nickel Co., Inc., New York City.
John R. Freeman, Jr., American Brass Co., Waterbury, Conn..
Geo. F. Geiger, International Nickel Co., Inc., New York City.
Carl E. Heussner, Chrysler Corporation, Detroit, Michigan.
J. W. Higgins, Packard Motor Car Co., Detroit, Michigan.
C. L. Hippensteel, Bell Telephone Laboratory, New York City.
G. B. Hogaboom, Hanson-Van Winkle-Munning Co., Matawan, N. J.
L. W. Hopkins, American Chain Company, Bridgeport, Conn.
J. M. Hosdowich, United Chromium, Incorporated, Waterbury, Conn.
R. E. Maeder, Frigidaire Corporation, Dayton, Ohio.
W. L. Maucher, General Electric Co., Schenectady, N. Y.
B. H. McGar, Chase Brass & Copper Co., Waterbury, Conn.
Walter R. Meyer, General Electric Co., Bridgeport, Conn.
E. V. Mott, Western Union Telegraph Co., New York City.
C. F. Nixon, Ternstedt Mfg. Company, Detroit, Michigan.
R. J. O'Connor, Contract Plating Co., Bridgeport. Conn.
W. M. Pierce, New Jersey Zinc Co., Palmerton, Pa.
W. M. Phillips, General Motors Corporation, Detroit, Michigan.
Lawrence M. Rasmussen, Brooklyn, N. Y.
K. W. Schwartz, United Chromium, Incorporated, New York City.
Joseph P. Sexton, Sargent & Company. West Haven, Conn.
Philip Sievering, New York City.
T. F. Slattery, Bureau of Engraving & Printing, Washington, D. C.
Gustaf Soderberg, The Udylite Company, Detroit, Michigan.
E. Sohn, Standard Sanitary Mfg. Co., Louisville, Ky.
P. W. C. Strausser, Research Associate, American Electro-Platers' Society, Washington, D. C.
Floyd T. Taylor, The Bullard Co., Bridgeport, Conn.
Van Winkle Todd, Hanson-Van Winkle-Munning Co., Matawan, N. J.
T. A. Trumbour, Metal Industry, New York City.
W. A. Wesley, International Nickel Co., Inc., Bayonne, N. J.
L. R. Westbrook, Grasselli Chemical Co., Cleveland, Ohio.
Maxwell M. Wise, Parker Wolverine Co., Detroit, Michigan.

Read the Branch News and learn what the other Branches are doing in the "Membership Drive"

In Memoriam

Mrs. Charles H. Proctor

Beloved wife of the founder of the American Electro-Platers' Society, died suddenly at her home, 264 Argyle Place, Arlington, N. J., on Tuesday, October 9th, at 1.50 A. M. in her 70th year.

Mrs. Proctor had been in perfect physical health throughout her lifetime, never having required the services of a physician until stricken with a rupture of a blood vessel of the heart on Sunday evening, October 7.

On September 11, Mr. and Mrs. Proctor, their son Harry and granddaughter Jeannie returned from a trip around the world, having left New York on May 31. The Proctors have travelled extensively, having been to Europe several times, also to Central America, Pacific Northwest and the greater part of the United States. They were planning to spend the coming winter in Florida and a trip to the Orient in the Spring.

Mrs. Proctor was well known to members of the A.E.S. and their wives and her sudden demise was a severe shock to her family and many friends. Her husband loses a companion who will be greatly missed.

While President Gilbertson and the Supreme Officers of the A.E.S. sent telegrams of condolence, we, in the name of the entire membership extend our heartfelt sympathy and condolence to our founder and his family in their great sorrow.

Mrs. Proctor is at rest in Arlington (N.J.) Cemetery in the family plot.

Beautiful floral tributes were sent by the Newark and New York Branches and Mrs. Proctor's legion of friends.

She leaves besides Charles H. Proctor, two sons, Harry and Edgar L. and a daughter, Mrs. Osborne Preston.

Requiescat in Pace

A METHOD OF COSTING PLATED PARTS

By R. M. JAMES

Read at the Detroit 1934 Convention

THE purpose of a cost system is to enable the manager of a shop to know the cost of each individual job, and consequently, the profit or loss on it.

If the costs are known, prices can be quoted that will insure a profit, and there is not much danger of taking a job, expecting a profit, but actually taking a loss.

Furthermore, by figuring the cost and profit or loss on each job completed, it will be easier to manage the business so that the most profit will be made from it.

A comparatively simple method of costing a plated job is illustrated on pages following. There seems to be a lot of figures, but usually it is necessary to compile them only once a year.

The cost details of an Electric Iron Cover are shown. This job is finished in Chrome. The items of cost are:

1. Labor
2. Overhead
3. Material

The labor cost is broken down to operations with the hours required and the average labor rate for each operation. If a piece work system is used, the piece prices would be used instead of the hours and hourly rates. The overhead cost is shown as 77c. per labor hour. This rate will be explained later. Material cost is found by multiplying the number of square feet finished by the cost per square foot of nickel and chromium material. These unit costs will also be developed later.

The total of labor, overhead and material gives the cost of the job. Profit must be added separately as a percentage.

The method of working out the overhead rate (77c. per labor hour) is also shown. The different classes of expense are those used by one large corporation. Each man may desire a different classification, but every shop will have certain:

1. Fixed Expenses
2. Expense or Service Labor
3. Miscellaneous Supplies
4. Maintenance or Repairs
5. Other Miscellaneous Expense

It is important that all expenses be reviewed at least once a year, as is shown below, and the ratio of overhead expense to direct labor worked out. In this example, the total expense was $6,930.00, while the direct labor hours for the same period were 9000, which makes the overhead expense equal to $.77 per hour. If the shop is on a piece work basis, the expense is divided by the direct labor in dollars to find the ratio or percentage to use in costs.

The method of finding the cost per square foot of finished material is shown. The reason these materials cannot be included in the overhead is that two different finishes may have the same labor cost, but the finishing material will cost twice as much on one as on the other.

FINISHING COST — IRON COVER

Direct Labor		
Burr Edge	.43 Hrs. @ .76 =	$ .3268 per 100
Brush	.48 " " .76 =	.3648 " "
Polish	.51 " " .76 =	.3876 " "
Nickel Plate	.70 " " .60 =	.4200 " "
Color Buff	2.10 " " .76 =	1.5960 " "
Chrome Plate & Buff Complete	2.00 " " .72 =	1.4400 " "
TOTAL	6.22 Hrs. =	$4.5352 per 100
Overhead	6.22 Hrs. @ .77 =	$4.7894 per 100
Material		
Nickel finishing material	70. sq. ft. @ .0125 =	$ .8750 per 100
Chromium " "	35. sq. ft. @ .011 =	.3850 per 100
TOTAL		$1.2600 per 100
TOTAL COST		$10.5846 per 100

OVERHEAD
POLISHING, PLATING AND BUFFING DEPT. AVERAGE EXPENSE PER MONTH

Fixed Expenses		
Building Depreciation		$159.00
Heating & Water		140.00
Power & Lighting		530.00
Taxes and Insurance		90.00
Depreciation Tools & Equipment		607.00
Salaries		630.00
Office Expense, Telephone, Telegraph, etc.		74.00
	TOTAL	$2,230.00
Service Labor		
Watchmen & Janitors		$119.00
Receiving & Shipping Clerks		238.00
Foremen		360.00
Inspectors		100.00
Truckers		203.00
Others		602.00
	TOTAL	$1,622.00

Miscellaneaous Supplies		
Buffs, Rags, Compounds, Oil, etc.		$740.00
Experiments & Samples		69.00
Tote Boxes, Wire Brushes, etc.		275.00
	TOTAL	$1,084.00
Defective Workmanship and Other Losses		743.00
Maintenance		
Rearrangement		$48.00
Building Repairs		61.00
Machine Repairs		350.00
R & R Polishing Wheels & Machining Tools		245.00
R & R Ovens, Tanks & Other Equipment		247.00
	TOTAL	$ 951.00
Miscellaneous Expense		
Welfare, Group Insurance, Etc.		$81.00
Annuities		91.00
Accident Compensation		57.00
Others		71.00
	TOTAL	$300.00
	GRAND TOTAL	$6,930.00

Average number of productive hours worked per month.....9,000
Average overhead per productive hour.....$6,930 ÷ 9,000 = $.77

FINISHING MATERIAL COST

Cleaning Material	*Cost*
Cecolene	$2,806.25
#7670 Caustic Soda	170.10
#25 Magnus Cleaner	864.00
#92 " "	95.40
#64 " "	97.60
#63 " "	254.00
Sodium Cyanide	103.20
TOTAL	$4,390.55

Material Cleaned — 839,895 sq. ft.
Average Cost per sq. ft. — $.00523

Nickel Plate	
Powdered Borax	$16.73
#53 Burnishing Soap	301.22
Copper Cyanide	100.00
Kerosene	106.21
#4840 Naphtha	22.94
Liquid Wax	28.20
Ammonia	12.00
Rock Salt	10.00
Peroxide	148.20
Nickel Anodes	1.001.10
Double Nickel Salts	49.50
Single " "	402.00
Boracic Acid	73.62
Epsom Salts	19.98
Cadmium Pencils	4.40
Inventory Reduction	304.00
TOTAL	$2,600.10

Material Nickel Plated — 365,714 sq. ft.
Average Cost per sq. ft. — $.00711

Chromium

Chromic Acid	$735.00
#7587 Rack Coating	25.00
TOTAL	760.00

Material Chromium Plated — 135,039 sq. ft.
Average Cost per sq. ft. — $.00563
All material plated has to be cleaned first, so cleaning and plating materials must be added together as follows:

	Cleaner	*Plating*	*Total*	*Use*
Nickel Finish per sq. ft. —	.00523	.00711	.01234	.0125
Chromium " " " " —	.00523	.00563	.01086	.011

In the example, all the materials used in cleaning for one year are grouped together. The total cost divided by the number of square feet cleaned in one year gives the average cost of cleaners per square foot. ($.00523)

In the same manner, the total cost of all materials used in nickel plating, divided by the number of square feet nickel plated, gives the average cost of nickel material, ($.00711) per square foot.

Likewise the cost of chromium plating material is $.00563 per square foot.

Since cleaning is a part of all plated finishes, the cost of cleaning material must be added to the plating material cost. The costs being used by one large plant are as follows:

1.	Nickel Plate	$1.25 per 100 sq. ft.
2.	Cyanide Copper Plate	1.20 " " " "
3.	Cadmium Plate	3.00 " " " "
4.	Chromium Plate	1.10 " " " "
5.	Tin Plate	1.50 " " " "
6.	Hot Tin Dip	3.00 " " " "
7.	Bonderizing	.25 " " " "
8.	Stainless Steel Bright Dip	1.50 " " " "
9.	Ordinary Bright Dip	.50 " " " "
10.	Lacquer	3.30 " " " "
11.	Synthetic Lacquer	1.50 " " " "
12.	Black Japan	.30 " " " "
13.	Dulux Primer	.54 " " " "
14.	Dulux Lacquer	1.10 " " " "

When these costs are worked up once, it will be necessary to change them only once a year to take care of price changes; or, if the shop methods are changed, then a different amount of material may be used per square foot.

Two things are necessary in order to work out these costs accurately. First, an inventory of the materials on hand such as anodes, must be taken at the beginning and end of the period. Second, the number of square feet in each job must be calculated. This plan does not require the keeping of many records or much time to keep them. The routine records necessary are:

1. A distribution of the payroll
2. The amount of each material purchased and cost
3. The number of square feet finished

In setting up an overhead rate it is necessary to compile the various expenses over the past year, and at the same time make a forecast (budget) for the new year. This analysis of expenses may point out excessive items and thus initiate savings which will pay many times over for the effort.

CHAIRMAN PHILLIPS: I would like to ask a question, if I may. On your last page you have the cost of nickel plating. Can either you or Mr. Van Derau give us any idea of how thick that plate is, on the average?

MR. VAN DERAU: What particular plate?

CHAIRMAN PHILLIPS: You show "nickel plate".

MR. VAN DERAU: It is .0005", and the copper about the same.

CHAIRMAN PHILLIPS: I think that is an interesting comparison. The two are very close together.

MR. VAN DERAU: I would like to clear that point up in your mind. Too many of us make a comparison of the cost of nickel per pound and the cost of copper per pound, and then we make a quick deduction in our minds and say, "That can't be!" They pay only forty per cent of the cost of nickel, still it comes out about the same cost.

Now, here is the reason for that. In nickel you buy nickel salts, and if you are using single you have 22% metallic nickel. In other words, out of 100 pounds of nickel salts you get twenty-two pounds of metallic nickel. It is soluble in water. The cost of the salts per pound, if you take those at 10.5c. or 11c., whatever the market happens to be, and multiply it by 4.5, will show you that the cost of a pound of metallic nickel and nickel salts is just about equal to the cost of a pound of metallic nickel coming from the anode.

Now, if we take copper — particularly a cyanide copper — and take it over a year's time, taking into account that carbonates build up and there comes a time when it is economical

either to scrap the solution because of the high carbonate content and the rapid decomposition of cyanides or to freeze out the carbonates, in most cases, unless it is a large job, it is generally a case of scrapping, and if we have a cyanide copper solution that starts off at about two ounces of carbonate when it is new, at the end of the year we will find that we are up to approximately twenty ounces, and you need a crane to lift cyanide into the tank to keep your free cyanide content up.

Now, over a year's time, taking into account that you scrap this solution about once a year and build up, you will find that it takes three pounds of sodium cyanide to deposit one pound of copper.

Let us say that we are paying 15c. a pound for a copper anode, and we have used three pounds of cyanide at 17c. a pound. We have a total of about 66c. a pound for our copper, as against 46c. or 48c. for our nickel, and if you are plating the same amount of copper by weight or thickness (there may be some difference there because of the difference in the weights of those two metals), your copper cost per square foot, from a cyanide copper bath tends to be more expensive for material than the cost of nickel.

Now, as regards that thickness of coating on articles such as flat irons and waffle irons, which are subjected to heat, in which you have discoloration, turning peacock and every other kind of color, it is necessary to put on at least .001″ thickness of plate. On white nickel parts and parts of lesser importance they may be as low as .00025″ to .0003″ plate, and on the average we figure that we are putting on approximately .0005″.

As a matter of fact, you will find some variation from one plant to another. If we follow out the recommendations of our recent research, in which they are talking about plates of .002″ in thickness, it would be necessary to standardize by accumulating all the factors that entered into making up these costs and set a new standard in order to charge the proper amount to the customer.

Now, if the job platers, in particular, start plating .002″ in thickness on their wares, they are going to have to raise their prices, because they are going to be spending more than the profit would represent for material.

DR. BLUM: I should like to call attention to an even more striking example of the fallacy of basing cost on the cost of

material, because if we took the amount of chromium, the weight of the chromium on a square foot of surface and calculated the amount of chromic acid that would have to be purchased, and called that the cost of chromium plating, we would have just about one-tenth of the cost given here.

MR. VAN DERAU: There is one other point that I would like to point out to you on this chromium, and that is that these figures, to start with, do not represent all of the finishing departments. The plating departments are divided into three divisions. These figures are established for one division, but it is the same system as used throughout the rest of the product, and this really is the picture of the iron department.

Now, with regard to chromic acid in the iron department, that happens to be an automatic chromium plating machine that has been in service for over four years, and we have proved the figures three times. The time is a three-minute plating cycle in this automatic plating machine. Naturally, you have almost standard conditions from day to day. The solution is chemically controlled and is checked every day, so I do not know how you could get a more standard condition.

The cost of plating a square foot of chromium on the automatic machine as against a hand-operated job is one-third less for chromium plate than on the hand job. Here is the way that is explained:

This happens to be a relatively slow transfer. This part goes up, and it has time enough to drain back into the tank, so you are not carrying a lot of drag-out through excess drippings into the first water rinse tank. On the other hand, because you speed up the operation and do not want the operator standing there, you promote a waste of chromic acid.

Then they come out of there, and if you have parts that have recesses and will hold solution, naturally they come out quickly and drag it over into your water tank, so it is very easy to see why the cost of a hand-operated tank is approximately 30% more for chromium plating than with an automatic machine. Those are just some of the things you run into when you make these comparisons.

CHAIRMAN PHILLIPS: I would like to call attention to one other thing in this paper, which I think is very highly commendable. They say that there are three things on which people generally disagree — religion, politics, and overhead.

Now, on this compilation of overhead, there is no argument about it. He has his materials and factors that make up overhead for that department all down here. He is not just taking a percentage against the labor, which is one of the best ways to lose money that I know of.

MR. VAN DERAU: I want to point out just a couple of experiences that show why those costs are important. They are particularly important to the job platers.

Companies that are manufacturing the product can have these losses and have them varied in other departments and not know it, because in the overall cost they get enough money for their product. A job plater either makes money the first time he has a job or he loses it. He may never get the job again, so it is very important that he have the right costs or the right system for knowing that his costs are such that he can go out and bid fairly for his work.

We will take an experience that we had. As a matter of fact, it is the thing that made us build up the cost for plated materials.

For years the accountants took the productive labor — polishing, plating, and buffing — and in this productive labor they found that the plating material cost was 25% of the labor. Well, to every $1 in labor they added 25c. Then we came along and developed a lot of automatic polishing and buffing machines. Our plating labor remained almost constant. That 25% did not remain at 25% in the cost. It jumped to 35%, and the next year it jumped to 43%, and then it finally jumped up to as much as 60%. Every move we made to reduce labor through the development of automatic equipment automatically threw a deficit into the material account because we were costing on the wrong basis, so that is the reason we went to costing the actual cost according to the plate and kind of material being put on, and disregarded putting that against labor as a certain percentage.

We had a job that we took in as a favor. There were no jobbing facilities in our town, and there was a company that was making outlet boxes for push-button switches, and they wanted them cadmium plated. Well, we were doing some cadmium plating — not a great deal — and as a favor to this other manufacturer we took on the job. We figured the job, with our labor and our burden, and then added 15% for handling

or profit. We set rates on that job after it came in, and we beat the estimated rates by about 15%. We totalled it up and said it was a good job. We said to ourselves, "We will do all of these they want done, just to keep that job going."

We went along and operated for almost a year, and when we got through with the orders as they sent them in, having at the same time started to build up these costs, we discovered that we had not made a 30% profit, but had actually donated $1,400 to this competitive concern. You see, we did not have the true costs, and there was no way of getting them.

We will take another case: The engineers designed a floor type heater. They wanted a polychrome finish. It was equal to four coats of lacquer. We were using, at that time, 35% of the productive labor as the base. Well, a girl making $3.00 a day can spray out about $20.00 worth of lacquer with a spray gun in a nine-hour day. Where is that 35%? She makes $3.00, so she should use about $1.05 worth of material. Instead, she is using approximately $20.00 worth. The difference is spread over something else.

When they came out with this design there was an estimate put in for profit, but if we had not pointed out to them what they were putting in in the way of materials from which we were not recovering our cost, we would have lost more than three times the margin of profit estimated in the original estimates, so it is a very important thing in the cost of plating to know what your true costs are for materials.

BRIGHT NICKEL

By MR. ECKELMANN, Pyrene Mfg. Co., Newark, N. J.

Read at Detroit 1934 Convention

IN view of the great interest manifest by the electroplating industry in bright deposits of nickel and other metals, and the recent very marked progress made with bright plates, I believe it timely to present to this body some information on this development, particularly as regards nickel, which metal is used perhaps in greater quantities than any other in the plating industry. The extent to which nickel is consumed may be gathered from a study of the following:

According to figures given in the *Metal Industry* of June, 1934, the world consumption of nickel in 1933 totaled approximately

96 million pounds. The consumption in the United States and Canada totaled approximately 57 million pounds, or roughly about 60% of the world production. In the United States there were from five to six million pounds of nickel used by the plating industries, mostly for decorative and protective purposes.

Though brilliant electro deposits of nickel have been obtained commercially for quite some time, it is important before enlarging on this subject to define, in at least outline form, certain characteristics of the deposit and the electrolytes, to serve as a basis for comparing recent progress with past results. It is also obvious that this comparison should be based more on commercial practice than on results obtained on a laboratory scale.

Let us, then, attempt to define and specify the requirements as to deposti, also operating properties of any electrolyte producing bright nickel:

(1) THE ELECTROLYTE

(a) It must be stable upon continued and intensive use.
(b) It must have a wide operative range as to pH, concentration, temperature and other variables.
(c) It must possess high cathodic and anodic efficiency.
(d) It should produce a bright plate of maximum brilliance at current densities at least as high as those now commonly used and, if possible, at higher ones.
(e) It must have high throwing power.
(f) It should be least sensitive to contaminants, both organic and inorganic.
(g) It must be simple to control.
(h) It should be readily adaptable to corrective and purification methods.

(2) THE DEPOSIT

(a) It must possess maximum brilliance irrespective of thickness.
(b) It must have minimum porosity.
(c) It must have maximum adherence.
(d) It must afford high protective value against corrosion.
(e) It must be uniform, dense and ductile.
(f) It should increase the throwing power of any chromium deposit subsequently applied.
(g) It should not be critical as to hydrogen absorption.

(h) It should be free from nickel hydrate in the crystal grid.

It can be readily assumed that any electrolyte and deposit even approximating the above requirements will not only represent a marked advance in the electroplating practice, but eventually prove of great value to the industry in general.

There are today in commercial operation nickel baths producing bright plates. However, it is doubtful if any of these can even approach the requirements just outlined. Most of these bright baths consist of simply the usual nickel solutions containing sulphates, chlorides and boric acid in varying proportions, to which have been added rather small amounts of certain organic or inorganic compounds. Among the organics are various gums and colloids; cadmium and cobalt salts more or less cover the inorganic additions. These addition agents, present in very small amounts, impart a very satisfactory brilliance to the nickel deposit but only then this is quite thin. The addition agents are difficult to control quantitatively, and somewhat critical as to the brilliant range. They are also co-deposited with the nickel into the crystal grid, tending to enlarge it rather than to consolidate its structure. It is generally believed that these agents have a beneficial, inhibiting effect on the growth of the nickel crystal, but if that be so the indications are that they at the same time, by their presence in the plate, prevent a close packing together of the crystals. These agents, further, promote the co-deposition of nickel hydrate with disturbing effects in the physical properties of the deposit.

In fact, brilliant deposits can be easily obtained from the usual nickel baths even without the assistance of these additional agents, if the thickness is of no importance. Though the brilliant deposits may be slightly heavier in baths containing the above-mentioned addition agents, the plate is still too thin to be of value other than for a flash finish on cheap novelties. Furthermore, this type of bath can only be operated at rather low current densities with consequent increase in the plating period. Outdoor exposure tests conducted by the American Electro-Platers' Society and the A. S. T. M. have shown that no plated coating containing nickel of less than .001" thickness will satisfactorily protect a ferrous base under severe conditions of exposure. From this it becomes evident that thin nickel deposits could have little commercial value.

Dr. Max Schloetter, of Berlin, has found that in a series of

tests that peeling of chromium deposits, applied over nickel plate, if not due to improper cleaning is caused primarily by hydrogen being absorbed by the nickel plate during the chrome plating process, and which hydrogen, when its quantity exceeds the maximum absorbing capacity of the nickel, diffuses to the base metal, creating a pressure between the nickel and the base sufficiently high to cause the deposit to blister and lift, in some cases immediately and in others after standing for a considerable period. These tests have further shown that the hydrogen absorbing capacity of a nickel plate increases with its thickness, and it has thus been shown that a heavy undercoating of nickel is the best insurance against the vexing problem of peeled chrome plated work. A bright nickel process is, therefore, of only small commercial value if it does not maintain brilliance irrespective of deposit thickness.

There are other types of bright nickel baths prepared with the use of cyanides, citrates, formates, lactates in various combinations with inorganic salts of nickel which show some promise, but which are, to my knowledge, not in commercial use due to their erratic behaviour, instability and low operating efficiencies.

Since the particular bath which I am going to discuss in the following has been introduced to the industry, some electrolytes have appeared which produce brilliant deposits within the commercial thicknesses of metal deposits as specified for the finishing of parts by the automotive and other industries. I have found these baths unstable and erratic in operation, as the organics present decompose slowly in use, loading the solution with inert waste products which subsequently become included in the deposit with most undesirable effects on its properties. These disturbing effects are caused by the decomposition of the organic factor by electrolysis, reaction with the nickel salts in the bath itself, or the cathode metal.

I am now coming to the discussion of the high gloss nickel bath which forms the subject of this paper. This bath is finding increasing use by the industry, and has been in satisfactory operation commercially over quite a long period, so that definite conclusions for its properties may now be reached. This bath contains metallo-organic salts of nickel in combination with some inorganic salts of this metal, which, however, function mainly as conducting agents.

This bath is stable and operates satisfactorily over a wide

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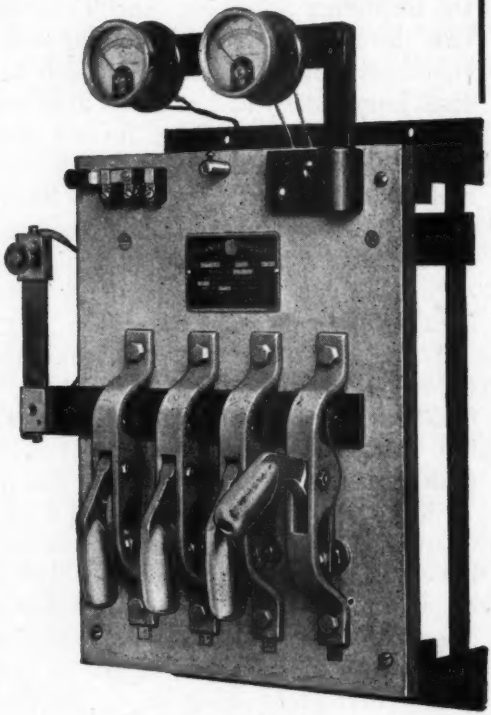

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range of pH, running from 2 — 6, at temperatures from 85 to 130° F. Concentration may be varied within 10° Be. wihtout affecting results. Brilliant plates may be obtained from this bath at current densities as high as 200 amps./sq.ft., and although it is questionable whether such high current densities would be used commercially, it is indicative of the great speed and flexibility of the bath, as far as this variable is concerned. Furthermore, the solution is entirely self-sustaining from the anode, the anodic efficiency being very high, so that approximately only about one-half of the anode surface of that usually required for the old type baths is necessary. The latter fact, naturally, cuts anode investment in half.

The cathode efficiency at the lower current densities is approximately 99%, diminishing to approximately 95% at the higher CDs.

This new type nickel bath produces brilliant deposits up to 1/8" in thickness and more, the brilliance tending to increase with increasing thickness of plate. It is not known as yet up to what thickness the plate may be deposited without affecting its brilliance or structure, 1/8" being the maximum so far attempted here. It is interesting to note that when applying these plates to somewhat rough metal surfaces, the physical imperfections present in the base appear to be minimized after a thickness of 1/1000" or more is obtained. With deposits as thick as 1/8" a mirror-like surface is obtained even on a somewhat rough base. As an explanation of this phenomenon it may be that a series of layers of very fine crystals are, in this process, superimposed on each other, rather than that the original base crystal is made to grow larger to produce thickness of the plate.

It may be mentioned that these bright plates in thicknesses of approximately .0005" and above are not always as ductile as those obtained from some of the standard type inorganic baths. However, as the physical characteristics of the deposit are largely governed by the proper correlation of the bath operative factor, fairly ductile coatings can be obtained. Further study is required as to the actual effect of the different factors on the bright nickel base on the ductility of the plate.

The throwing power of a properly electrolyzed and aged solution is very high and entirely satisfactory for all commercial purposes. Due to the wide working range, control of the solution is simple, requiring only determination of pH from time

to time and also concentration. The temperature range is wide, but the maximum limit must be carefully observed, as above this, lack of brilliance and fogging will result.

The bath is no more sensitive to contamination with copper, iron, zinc and lead than the usual nickel solutions. Copper, if present in excess, will cause fogging of the deposit, particularly at the lower current densities. Iron must be carefully watched, as its presence will cause pitting. Lead, if introduced into the solution through stray currents on a tank lining, will produce black streaks. However, the bath is readily adaptable to corrective and purification methods, no special or elaborate procedure than those ordinarily employed being necessary for this purpose.

I believe it is generally understood that all freshly prepared nickel baths must undergo a period of aging or working before satisfactory results are obtainable. With this new bath this period is considerably longer, as evidently the constituents cannot be brought into proper combination and balance as rapidly as in the old type inorganic bath. At the beginning of commercial operations this was not understood so well, and led to some disappointments, but now means have been found to properly age the solution and bring it to optimum efficiency within a very short period after its preparation. It has also been found possible, recently, to convert old and well-aged baths of the ordinary type into this new type bath within a few days. This should not be confused with merely the introduction of an addition agent, as the conversion of an old bath into the high gloss type involves study and analysis of the old bath, if the conversion is to produce a stable and efficient electrolyte.

The properties of the plate have already been described above. Its extreme brilliance is evidently due to the particularly fine structure of the crystal grid and to the fact that no nickel hydrates or other foreign bodies are occluded. Because of the close packing of the crystals porosity is at a minimum, and density at a maximum.

The deposit has the peculiar property of increasing the throw of any chromium subsequently applied. This property was observed when the bath was first used commercially, leading to more definite data, determined and described in a paper by Korpiun & Vogel, from which I am going to take the liberty to summarize and quote:

"Several copper polished strips were nickel plated in the commonly used nickel baths, with a deposit weight of 50 g per square meter. Immediately after rinsing, the strips were chromium plated. The throwing value of these tests has been compiled in the following table:

(1)	Unpolished deposits throwing power	9.5 cm.
(2)	Polished deposit	6.5 cm.
(3)	Bright nickel deposit	14.5 cm."

These show that the throwing capacity of the chromium bath is influenced in a very great measure by the type of nickel plate on which the chromium has been deposited. Particularly the fineness of the nickel deposit crystal seems to exercise a great influence on the throwing capacity, as evidenced by the fact that with increasing gloss, hence with increasing fineness of grain, the throwing capacity rises. It might now be deduced that polished deposits would also cause the throwing capacity of a chromium bath to be higher with less glossy or dull deposits. This, however, is not the case, because the fineness of the grain in the deposit is altered in no manner by the polishing process.

The throwing capacity of the chromium bath is, therefore, even considerably lower over polished nickel deposits than over unpolished ones. The cause of this behavior cannot be now definitely stated. It must be considered that the polishing operation process "blots out" the surface of the metal crystals lying on the outer side of the deposit or, more exactly, deforms these. Numerous tests have taught us that deformed crystals behave quite differently, physically and chemically, from normal, free-grown crystals.

Further tests have shown that the throwing capacity of all other chromium baths are influenced in the same manner as shown aboye for one particular bath. It has above been shown that unpolished, dull nickel deposits caused an increase in the throwing capacity of the chromium bath higher than with a polished one, and always was the throwing capacity of the chromium baths over finely grained, highly glossy nickel deposits considerably higher than over ordinary dull deposits.

The results of the described tests may be summarized as follows:

1. Over polished nickel deposits the throwing capacity of chromium baths is worse than over dull, unpolished nickel.

2. Over high gloss and, therefore, finely grained nickel deposits, the throwing capacity of chromium baths compared with that over dull, coarsely crystalline deposits is improved; chromium is, therefore, then more easily deposited in the process of profiled articles.

The operation of the bright nickel solution and proper maintenance of same does not require any more care and attention than that given the old type baths with the exception, of course, that the temperature and concentration must be maintained within the proper limits which, as mentioned before, affects the brilliance and physical characteristics of the plate. It is also important to correlate the concentration of the electrolyte to the pH value and current densities, particularly when these are used at the higher values.

SOLUTION

The bath can be used in the ordinary plating tank, if this be rubber lined, plain wood, or lead lined. Tar or pitch tank linings are not satisfactory, as the solution is operated warm. No other than a 99% plus nickel anode can be used, with the exception of a lesser nickel content only if the balance is nickel oxide or carbone. The anodes must be bagged and the solution filtered periodically, particularly with agitated baths. If this is not carefully observed, rough deposits will result, produced by caraphoretic growths on the cathodes. This difficulty is augmented in these bright baths, due to the very rapid anodic corrosion. Still solution can be operated at C.D. up to 40 amps. per square foot, agitation being essential at higher ones.

The electrolyte is satisfactory for barrel plating, but due to the higher C. D. necessary, heavier leads and the best contact possible is essential. The design of the barrel for this new bath deserves study.

As to cleaning, no departure need be made from the usual practice, except that reasonable care should be exercised, as in addition to preparing the base metal surfaces in the proper manner for good adherence of the nickel, any impurities or surface effects that might be present will cause localized dulling of the plate. With thick nickel deposits as obtained in the usual baths, anything affecting the crystal nucleus or structure would pass by unseen, as the deposit is sandy and dull. On the other hand, with a bright bath the effect of any such impurities

or disturbances would not only affect the brilliance but the physical characteristics of the plate as well.

As the brilliance of the deposit depends largely on the base surface, it is obvious that this should be well prepared, as any imperfections or scratches will be visibly translated by the nickel when the deposit is less than 1/1000".

On sand-blasted and satin-finished base metal, rather interesting and attractive effects are obtained. The nickel on this particular type of surface, when in thickness of over .0005", has a peculiar depth and brilliance, and, furthermore, does not readily mark on handling, any smudges being easily wiped off.

Another interesting property of the deposit is its retention of brilliance for a considerable period. Of course, though, eventually the usual dulling will occur.

The most valuable contribution to industry made by this development is not only the quality of the plate, but the fact that in most instances considerable economies are effected. For example, due to the possible use of high current densities, thick deposits may be obtained in minimum time, thereby reducing the volume of electrolyte installed, anodes, floor space, etc., etc.

In addition, subsequent polishing of the nickel is eliminated with obvious savings in the necessary labor and materials and power necessary for this operation. The nickel metal lost during the polishing, which I am informed runs to approximately 15% of the thickness, and considerably more at the edges, is saved. Due to the high operating efficiency of the bath, also high throwing power, deposit specifications can be more closely adhered to.

Some additional savings will accrue from the elimination of rewiring and recleaning before chromium plating, as the nickel parts can pass directly into the chromium bath with only an intermediate water rinse. With a buffed nickel deposit, requiring cleaning, there is always the danger of hydrogen absorption when electro-cleaning cathodically, with the possibility of subsequent lifting or peeling after chromium plating, when the hydrogen absorbed during the cleaning operation, in addition to that absorbed by the nickel chromium bath, may exceed the maximum, producing peeling as described in an earlier part of this paper.

The point may be then raised that certain difficulties would

arise on using the racks, leaving the chromium bath for nickel plating, due to the danger of contaminating the cleaning and nickel baths with chromium. However, it is my opinion that this is not a difficult matter to overcome, as cleaning the racks is more or less simple.

In closing I wish to thank this body for their most kind attention, and trust that I may have the opportunity at some later meeting to present a paper on the chemistry of the bright nickel electrolyte and its working during electrolysis. I have a number of samples of the plate which will be available for inspection at any time.

CHAIRMAN SLATTERY: Mr. Eckelmann's very interesting paper will, I am sure, cause some questions.

MR. W. R. MEYER (General Electric Co., Bridgeport, Conn.): I have had the honor of reading some of those papers from Max Schlechter that you secured for me, and I would like to discuss them here. I think that question of hydrogen absorption is not the only factor involved.

He did some work on hydrogen absorption of nickel and nickel-chrome deposits, and I think he regarded the hydrogen absorption as being the only answer to the problem of peeling of deposits. I do not agree with him. We ran some experiments in our own laboratories, and we find there are some other factors that enter into the proposition of peeling of nickel deposits.

(At blackboard). Say this is the steel and this is the deposit of nickel on it. According to his conception (and we may have a chrome deposit here), if you get a saturation of the nickel deposit with hydrogen the nickel will then impinge against the base and will develop, as he calls it, a gas film which will tend to lift off that nickel deposit. According to him, then, a thinner nickel deposit will peel much more readily than a thicker nickel deposit.

There is another factor that enters into it. We have a chrome deposit on there. What is the influence of a chrome deposit? We took plates of equal thickness of nickel and put a chrome deposit on one and no chrome on the other, and subjected them to electrolysis. The nickel plate did not peel off under those circumstances, but the nickel-chrome bath did peel off under the same circumstances.

I see no reason to assume that the nickel-chrome deposit would absorb any more hydrogen than the nickel deposit alone.

In every case, however, we got pronounced peeling from the nickel-chrome deposit, and not from the nickel alone; and if this gas blister theory of Schlechter's were tenable, we ought to get peeling with nickel on steel as well as with nickel on chrome.

I think there is another factor that I do not believe has been determined as yet, and that is the buckling stresses of chrome itself. We realize, too, that a third factor enters into the situation, and that is the factor of distortion, or hardening — the embrittlement of the hydrogen. Perhaps Mr. Eckelmann has something to say on that.

MR. ECKELMANN: I stated that you obtained no lifting with the nickel alone, but you did so when it was chromium plated. That is exactly the doctrine that I communicated, that the lifting is particularly noticeable when chromium is applied to the nickel, because the efficiency of the usual chrome solution, usually being so low, creates, at the cathode, large amounts of hydrogen that pass into the nickel, diffusing to the base and lifting it. If the nickel is leaving its own electrolyte, at the higher efficiency there will not be as much hydrogen to be absorbed.

Does that answer your question? Perhaps I did not get you clearly.

MR. MEYER: I do not think we quite agree on the interpretation. We took nickel deposits and subjected them to pronounced action of the electrolytic hydrogen. The nickel-chrome deposits would withdraw or peel off in two minutes. You could subject the nickel deposits to a twenty-minute bombardment without peeling. I should think you would very certainly saturate it with hydrogen in twenty minutes as against the two that you might have with chrome.

MR. ECKELMANN: Any statement I make would be considered theoretically, but I would assume that in the case of lifting with the chrome there is a possibility that the layer of chrome might more or less prevent as rapid an evolution of the hydrogen from the nickel itself; in other words, act as the cover on a box and permit it to pass into the nickel, whereas, if the chromium were absent the hydrogen may diffuse off to a more rapid degree. That is merely a theory. I have no experimental evidence to back that statement whatsoever.

MR. MEYER: All I can say is that I believe there is much more experimental work to be done on that problem. I do not believe we have the whole answer as yet.

Mr. Eckelmann mentioned several other things that I believe might be of pregnant interest. He mentioned the paper on the throwing power of chrome on various nickel solutions, and he mentioned that on a buffed nickel deposit the chrome would not throw as well as on an unbuffed nickel deposit, and did not offer any explanation.

I am wondering if the fact that when you buff a nickel deposit you generate considerable heat and tend to form a nickel oxide on the surface, which is fairly continuous and prevents good throwing power of the nickel, might be a factor that enters into it.

Another very important point that has been brought out is the fact that when you use an electrolytic cleaner prior to chrome plating you get poorer throwing power than you do when you use no cleaner at all. That may seem quite of value to electroplaters. I do not know whether that follows practical experience or not. That has been found out theoretically.

There is just one more question that I would like to ask Mr. Eckelmann. It is the question of whether addition of a bright nickel will actually increase the formation of nickel hydroxide, or whether it is not some other factor.

MR. ECKELMANN: It is a rather difficult question to answer unless you specify what type of brightener you are adding to the different materials that may be co-deposited in the grid. They may be hydrates; they may be decomposition products, or organic cells. I can not answer that definitely.

MR. MEYER: When nickel is deposited from a solution you tend to get depletion of the nickel ions adjacent to the cathode. When you do that you raise the discharge potention of your nickel, and tend to get a greater evolution of your hydrogen, and when you get evolution of hydrogen you get a basisity of your nickel and tend to form basic salts of nickel. We all know that. But what I could not quite see is how the addition of a brightener would affect that relationship that I just mentioned. That is what I had in mind.

MR. ECKELMANN: I would state that the addition of a brightener may be additive to that phenomena that you have stated there, as to the formation of basic salts at the cathode, that in addition to those you may co-deposit in the crystal grid portions of the brightener. As I said before, it is a difficult thing to discuss unless we can discuss the actual brightener we are using, and I am not at liberty at present to enter into that detail.

CHAIRMAN SLATTERY: Are there any other questions on Mr. Eckelmann's paper?

MR. M. H. LONGFIELD (Pheoll Mfg. Co., Chicago, Ill.): If considerable iron has got into the solution, and it is precipitated, would it interfere with the brightening effect?

MR. ECKELMANN: Not if it is removed. The iron, as a rule, has no effect on the brightening solution. So far as we have been able to determine it is the factor responsible for pitting. It has no effect on the brightener.

MR. LONGFIELD: As it is removed it does not take the brightener out of the solution?

MR. ECKELMANN: No.

DR. R. W. MITCHELL (Magnus Chemical Co., Garwood, N. J.): May not the question of the difference in peeling on the plain nickel plated and on the nickel plated covered with chromium be due to the difference in over-voltage of the hydrogen plated against the two different metals? There might be a certain critical value for hydrogen pressure on the metal surface at which it would diffuse into or saturate more quickly the chromium plated surface than the plain nickel plated surface. The nickel surface might be below that critical pressure and the chromium-covered surface might be above it. Somebody who has in mind those values might settle that point.

CHAIRMAN SLATTERY: Are there any further questions on that paper?

MR. HERMANSON: He said that there perhaps was a difference in the hardness of the nickel plate. We all realize that by any addition to the nickel solution you get a hardening of the plate. He spoke of changing — I am not sure of the words — something that would decrease the hardness, but I believe he is intimating that with the brightener, as he calls it, that is used to get this high lustre you get a hardness of the plate. I would like to know how much harder it is and if there is any way of reducing that hardness so that you can chrome plate commercially on a lot of things with sharp corners on them.

MR. ECKELMANN: I will answer the last part of your question first. There is no difficulty in chromium plating over this deposit.

The first part of your question brings out a rather interesting point, that the brittleness or ductility of this deposit can be controlled to a certain extent by a variation of the concentration

of the bath and the temperature. Aging, as I mentioned before, has a most important bearing on the physical characteristics of the deposit.

If there is any part of this development that now requires further study it is to obtain the exact correlation of the variables of the bath, either as its constituents or as its operating factors, to produce a plate as ductile as possible.

MR. DAVID GREENBLATT (Chicago, Ill.): If you use the brightener and buff it, are there any changes? Has the buffing any effect?

MR. ECKELMANN: If you are going to buff I do not see why you want to use a bright nickel deposit, because if the deposit is to be of any value so far as brilliance goes, its lustre and brightness should be equal to that obtainable by a buffing wheel.

MR. GREENBLATT: Some parts should have a little higher lustre, and on others you can get away with using only the brightener.

MR. ECKELMANN: I might answer that by stating that, as already mentioned in the brief address, the crystal of this deposit, when produced in excess of .005, has a brightening effect on surfaces that, with the ordinary deposit, would be rather dull; but please understand that it is absolutely impossible to obtain a smooth, brilliant finish on metal that is originally dull.

MR. GREENBLATT: Has there been any change when you add the brightener on the pH?

MR. ECKELMANN: The pH has very little effect — that is, within the ranges mentioned, of two to six, on the brilliance of the plate. Above six very satisfactory results have been obtained.

MR. STRAUSSER: Will you kindly tell us, Mr. Eckelmann, what material you have found best suited for bagging the anodes?

MR. ECKELMANN: The ordinary bags supplied by the anode manufacturers seem quite satisfactory if the precaution is taken to soak these bags when received, to remove any sizing; and we have also found it a very good thing, after this soaking and washing is effected, to permit the bags to remain in a one per cent solution of hydrochloric acid for about several hours, followed with another rinse before being put on the anodes.

CHAIRMAN SLATTERY: I think the questions that have been brought out here in relation to the chemistry of this solution

have been most interesting. I am wondering if there is not some member here who is operating this solution who could tell us of any economic condition that is brought about by operating this solution. Is there a member here who can give us any information on any economies effected by the use of the solution?

MR. LEO JENSEN (Chicago, Ill.): I can say that I have about 1,200 gallons of the Pyrene bright nickel solution at our Chicago plant, and there have been a lot of bags in it. I can state right now that we have probably turned out of our baths, in the last two months, 300,000 pieces of work. The work that we have turned out on which it has been most successful has been on brass or copper materials.

I might also say that one of the big automobile companies here in Detroit, for which we have been doing some work, has accepted all of our work done with the Pyrene solution, whereas some work done in the regular nickel solution by another company was rejected.

MR. JACOB HAY (Standard Plating Co., Goshen, Ind.): When we talk about economy there is one thing that we must keep in mind, and that is whether we accomplish that factor. Now, if I understood the speaker correctly, you get a certain royalty for your patents, which is absolutely right. But in my figures I have found that we can pay a buffer to buff the nickel, and we can even go to the extreme and pay the supply house for the line they furnish, and still come out on top so far as your royalty is concerned. In other words, there is no economy. These are actual figures. Maybe you can figure better than me.

First of all, the thing that we have to consider more than anything else is the message that President Roosevelt is trying to convey to us: to create a job for everybody. How are we going to do it when we create a bright nickel solution and eliminate anywhere from two or three to perhaps as many as twenty-five buffers?

Why do you not wake up to the fact that these patents that you are bringing out should be destroyed immediately? I mean it; I am not kidding you.

Plating is one of the worst rackets you ever got into. (Laughter) Right now you may laugh, but let me tell you one thing: Today, in this wonderful State of Michigan, one of the most successful States in the Union, we are paying good money as taxpayers to support a university which everybody loves and likes, and that

is the University of Michigan, and still they have to send pikers out to undermine the foundations of a good man.

How is that done? How can we do that? We do it in two or three different ways. If the citizens of Michigan can not support the university, let them call on other states. If they have some men who have to go out and solicit business to undermine the electro-platers in other states, it is pretty nearly time for the State of Michigan to wake up and tell those men to behave themselves and sit down where they belong. They are only professors, anyway.

DELEGATE GEORGE GEHLING (Delong Hook & Eye Co., Philadelphia, Pa.): I was going to say something, but the Chairman has insisted that we stick to the paper, so I think I am through, for the reason that I never used the stuff. But I did want to try to change the thought that Jake has conveyed, and create a better impression. Jake is a mighty well-meaning man, and he is as bad in some respects as I am in trying to put something across. We happen to put things across in the wrong way, and they do not work out right.

In this respect the only reason I wanted to speak for a minute was to try to see that you would not think wrongly of what Jake said in respect to destroying the patents or halting progress in any respect at all. The fact is that we are supposed to create jobs. We can not create them and we can not destroy them. There is somebody else in a high position and in the majority who does that for us. We have nothing to do with it, whether we patent things or not.

Let us keep progressing, but we have got to find another way so that we can keep people working. Nobody, whether it is these people with their solution, or anybody else, gets up these ideas with the thought of destroying some man's vocation. They are something that is got up for the benefit of the people. The fact that Jake has seen it in the light of the fact that it does a polisher or two out of a job does not make the thing right or wrong at all. The place where it is wrong is in the fact that we have a very greedy clientele that makes up the population of our world, and it has always been that way. People have been too greedy.

Let us look at it in another way. Try to find an economical way to use these things when they are produced, so that they will be for the benefit of everybody. They do not necessarily have

to destroy a man's labor. If we can do a job in an hour that used to take five, let us do it in one hour, but we ought to see that for that hour we get the same remuneration we formerly got for five, and then we will all stay alive and be happy.

MR. LUNBECK WRITES AGAIN

Dear Editor:

Last winter, while you Platers in the North were all but freezing, I wrote you telling of the wonders of a winter in Florida, of the lovely fruits, flowers and sunshine.

Well, I only told half of the story. After the terrible heat that the East and West have had to endure this summer I am more than glad I came here — Florida has been one of the four coolest states in the U. S.

The highest temperature reached here was 98°, but as soon as one steps into the shade there is a most refreshing breeze, and the nights are all one could wish for. Very few nights that some covering is not needed and one awakes so refreshed to hear the many beautiful birds singing, especially the mocking birds and bob whites.

No more cities for me. We have settled in a little village, of some 800 population, with the most sociable people one could find anywhere. The finest water in the State, supplied to home direct from artesian wells. Water tower for fire service only. Plenty of garden space; one can almost live from their home garden. Plenty of fine lakes nearby for good fishing, where if you catch less than a five-pounder they give you the laugh. Black bass a plenty as well as other kinds.

Quails and rabbits are plentiful, come right in your garden. It is just short of paradise to a shop slave.

Salt water fishing and bathing, 40 miles to Gulf; 38 to Tampa Bay.

Flowers are simply gorgeous and now the citrus fruits are soon coming in — oranges, tangerines, grapefruit and many others we of the North are not acquainted with.

Seems rather strange to be starting to plant a garden when the Northerners are beginning to dig in for the winter. Haven't seen a coal pile since coming here — all wood, about $7.00 for a year's supply and use the ashes in your garden. Ha, ha. Soon the tourists will be arriving, then our population will be about doubled.

Don't think the cold North will get me again.

I think, as does Al Hirsch, that the REVIEW is to be commended for its progress.

Sincerely yours,

Box 355 S. T. LUNBECK, Zephyrhills, Fla.

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You can operate ZIALITE at low initial current density—only 7 to 12 amperes per square foot—without depositing nickel by immersion; and, at any current density, you will eliminate black striae entirely. With its remarkably high throwing power, ZIALITE covers the deepest recesses and sheltered places easily and uniformly, without streaking, and without burning the edges and high spots. Because of its close grained and adherent deposit, *it gives a really white nickel deposit.*

When plating zinc, you will find the ZIALITE bath permanent, while the ordinary bath has to be discarded, or re-worked to remove the absorbed zinc, from 3 to 12 times a year ... for ZIALITE definitely retards the solution of zinc and the consequent fouling of the bath. And the chemical maintenance cost of ZIALITE is only $1.60 per thousand square feet of surface area plated.

See for yourself the amazing results to be had with ZIALITE. Send us samples of metals, of the most complicated design, colored for nickel, and we will plate them for you . . . without obligation, of course.

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ELECTROLYTIC CLEANING AND PICKLING*

By Walter R. Meyer, Electro-chemist, G. E. Co., Bridgeport, Conn.
Member Bridgeport Branch A. E. S.

THE electric current has been used extensively in cleaning and pickling and many cases of misuse have come under the writer's observation. Peeling, brittleness, and over-etching often result from improper use of the current.

ADVANTAGES OF THE USE OF ELECTRICITY

The values of the use of electricity are several:—

1. The mechanical scrubbing action of the hydrogen liberated at the cathode. 100 amperes for one minute will liberate over 600 cc of gaseous hydrogen. The scrubbing action is great because of the fine state of discharge of the gas and the closeness of its discharge to the cathode surface. This is of the order of inter-atomic dimensions. Because of these factors this volume of cathodically discharged hydrogen has a more effective cleaning action than would result from impinging an equal amount of a gas upon the cathode from an external source; for example, air agitation. The rate of discharge over various parts of the surface will be a function of conductivity and hydrogen over-voltage at the particular point concerned. If a metal with high hydrogen over-voltage (such as tin or lead) is deposited in the cleaning or pickling solution better "throwing power" of cleaning will be obtained. This principle is used in the Bullard-Dunn Descaling Process.[1]

2. The reducing action of hydrogen is very great, being greater in acid than in alkaline media. Its power of reduction is far greater than ordinary gaseous hydrogen because it is available for reduction in the atomic state. The powerful reducing action of atomic hydrogen has been studied by Kahlenberg and Huntzicker[2] who found that it reduced sulfate to sulfide, phosphate to phosphide and was capable of displacing nickel from solution. Potential readings as high as 780 millivolts in N $NiSO_4$ solution were obtained with nickel cathodes that had been subjected to cathodic discharge of hydrogen. This is surprising in view of the fact that nickel is rated as being .23 volts more negative than the normal hydrogen electrode.

*Presented at the October Meeting of the Bridgeport Branch of the Electro-Platers' Society.

3. When the work is made the anode, carbonaceous material may be oxidized or swept away.

4. By anodic etching, brittle buffed "skins" may be removed giving a stronger basis metal surface for plating, Anodic etching will occur in alkaline or acid solutions if the metal or its oxide, is soluble in the solution used. A depassifying agent may also induce anodic etching. The action of chlorides in causing anodic solution of nickel is well known. The late "Dad" Liscomb[3] has pointed out this action in the effect of chlorides in alkaline cleaning solutions on the corrosion of iron tanks or anodes.

CHOICE OF ACID

Let us take the case of electrolytic pickling. Which is better anodic or cathodic treatment and what acid is better, sulfuric or hydrochloric acid? An answer is difficult to give as it depends upon the material and effect desired. As a general observation, hydrochloric acid (muriatic) is better for general acid dipping as it is more effective in removing passifying oxide films and because the reaction products are more soluble than those of sulfuric acid. If pronounced etching is required, make the work the anode in hydrochloric acid. This holds for steel, lead alloys and copper alloys. In case of nickel basis metal, muriatic acid is much superior to sulfuric, when anodic pickling is employed.

If a light etch or a more easily controlled etch is desired, use a sulfuric acid solution. This is not recommended for nickel or lead basis metals. In the case of lead, either lead oxide or basic lead sulfate forms which is difficult to remove and may lead to non-adherence of the plated coating. In pickling of steel anodically in sulfuric acid solutions, chlorides present as impurities will sometimes cause accelerated pitting. An important consideration is that most metals tend to form passive films when anodically cleaned in sulfuric acid and sufficient time should be allowed for the acid to dissolve the passive film before removal of the work from the dip. A subsequent muriatic acid dip is very effective. Such passive films are excellently illustrated by the anodic treatment of aluminum.

Anodic etching at high current densities [5-6] in sulfuric acid has been used for iron when high adhesion is desired. Acid concentration is 4-7N, current density 150 amp/sq.ft. After a

short period of operation, passivity sets in and the evolution of oxygen sweeps away the loose insoluble carbonaceous material.

If cathode pickling is used, muriatic acid is preferred. In this process the effective action of atomic hydrogen is available for reduction of oxide films. Plating on stainless steel is made possible by this type of pickling. It has several disadvantages. Firstly, hydrogen embrittlement in case of steel. This has been recently studied by D. Alexejew[5] and his co-workers in Leningrad, who report that traces of impurities cause rapid embrittlement due to catalytic action. Mercury, arsenic and sulfur compounds were the chief offenders. The embrittlement action increases with impurity concentration, current, time and straining of steel. The acid concentration has little influence.

A second disadvantage in the use of cathodic pickling, is the plating action resulting from solution of the metal to be pickled. This is evident as a grey film on the work. It is structurally weak and may lead to peeling of subsequent deposits. This is especially true when the surface is smooth, and nickel and chrome plating follow. This condition should be watched and the solution discarded upon its appearance. Insoluble anodes as carbon should be used.

A third disadvantage is the formation of loose metallic deposits due to the reduction of oxide coatings already present on the work.

Electrolytic cyanide dips are sometimes used. In this use, the dangers present in anodic or cathodic pickling are also present. Anodic cyanide etching has been recommended for copper and brass to remove the thin, brittle, highly-worked skin present after buffing.

ELECTROLYTIC CLEANING

From a grease removal standpoint, cathodic electro-cleaning is twice as efficient as anodic inasmuch as twice as much hydrogen (by volume) is liberated than oxygen. Metals which are soluble of whose oxides are soluble in caustic soda should best be cleaned cathodically. Pronounced etching will result on anodic cleaning of lead or zinc.

The two chief difficulties in cathodic cleaning are hydrogen embrittlement and plating out of impurities. Alkaline cleaners containing caustic soda, or tri-sodium phosphate have been found to plate out lead, tin, copper, iron and zinc. A reversal

of current with a cathode with the above impurities upon it will not result in the plating off of all these metals. Tin, zinc, and part of lead will be plated off, but iron and copper will be oxidized to their respective oxides. I would like to emphasize this point as it is commonly believed that reversal of current will plate off the smut formed when direct current cleaning is employed. Reversal of current has its value in that the copper and iron are more readily removed in the subsequent acid dip. In cases of lead alloys a hot caustic dip (4 oz/gal.) is effective in brightening the lead surface by solution of the oxide to form sodium plumbite.

A trouble sometimes encountered in cathodic cleaning is the deposition of colloids resulting in pitted or non-adherent deposits.[7]

Anodic cleaning removes the danger of plated smuts but is less efficient. Care should be taken in the following acid dip to remove any passive films. Anodic cleaning is not recommended for lead, tin, zinc or copper alloys if a bright finish is to be maintained. It is not recommended for cleaning nickel prior to chrome plating, due to propensity toward nickel oxide formation.

Electrolytic cleaning of nickel deposits as a cathode previous to chrome plating may have an influence on the peeling tendency of the nickel-chrome deposit. According to Max Schloetter,[8] peeling of nickel deposits after chrome plating results from the pressure of hydrogen between the base metal and the nickel deposit after saturation of the base metal and the deposit with hydrogen. The hydrogen absorbed in electrolytic cleaning of the nickel would, consequently, increase the likelihood of peeling.

In view of the plating action in cleaners, it is better practice to perform the reverse cleaning in a separate tank. Chlorides should be kept out of the solutions and separate set-ups for soft metals as zinc and lead be used whenever possible. Provided grease removal is complete a non-electric cleaner will leave the work in a condition to obtain the best possible adhesion of the electro-deposit.

It is hoped that this picture of the dangers and advantages attendant with the use of electro-cleaners and acid dips will lead to their better understanding and utilization.

REFERENCES

1 — The Bullard-Dunn Metal Descaling Process — Colin Fink and T. H. Wilber — Trans. Electro-chemical Society preprint 66-24.
2 — H. Huntzicker and L. Kahlenberg — Trans. Amer. Electro-chemical Society, Vol. 63, page 349.
3 — E. J. Liscomb — Monthly Review — Jan. 1931, page 17.
4 — Der Einfluss des Kathodischen Wasserstoffs auf die Festigkeit des Stahls— Stahls — D. Alexejew, P. Afannassjew, W. Ostroumow-Zeitschrift für Elektro-chemie, Vol. 40, No. 2, page 92.
5 — B. H. Thomas — Proc. Inst. Auto Eng. 1920 — 601.
6 — J. P. McClare — Trans. Faraday Soc. 1924 20-87.
7 — G. Hogaboom — Monthly Review — Jan. 1932, page 30.
8 — Communication from Max Schlötter.

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Please mention THE MONTHLY REVIEW *when writing*

The Abstract Section

ABSTRACTS OF PAPERS ON ELECTROPLATING

DURING the past year the MONTHLY REVIEW has published brief abstracts of papers and patents on electroplating especially from foreign journals, most of these were selected by Dr. E. B. Sanigar from *Chemical Abstracts* with the permission of that journal. The rest were prepared by Mr. C. T. Thomas and other chemists associated with the Electro-Platers' Society. The Society is especially indebted to Dr. Sanigar for his service in this connection.

As this was a new venture for the REVIEW, consideration was recently given to the probable value of these abstracts to the electro-platers and to the possibility of increasing this value. The conclusions may be summarized as follows:

The numerous abstracts on electroplating that appear in *Chemical Abstracts* and in *Metals and Alloys* are written chiefly for chemists, many of whom have access to the original journals in case they desire further details. These abstracts are also valuable to those platers who have sufficient technical education to utilize the condensed information and who have opportunity to consult some of the original journals. The views of such persons are very well summarized in the letter of appreciation from Mr. Albert Hirsch in the September REVIEW.

To be of value to the average plater, however, the abstracts (especially of foreign papers) should be written in non-technical language and be sufficiently complete to permit some use of the data and conclusions without referring to the original paper. To prepare the latter type of abstracts requires considerable time as it is necessary for persons familiar with plating to read and summarize the original articles. In some cases, brief comments by the abstractor may point out the relations of the articles to other papers, or to current practice.

As such abstracts must usually be fairly long, it would be impracticable to include in the REVIEW, abstracts of all papers of possible interest to platers. Instead, an effort will be made to abstract in some detail a smaller number of the most important articles, from the current foreign journals. Brief

references will be made to articles in American journals that can readily be consulted by those interested. On this work assistance will be received from E. B. Sanigar, W. R. Meyer, C. T. Thomas, W. Blum, C. Kaspar, and others, whose names will be attached to the abstracts they prepare.

The aim is to render the best possible service to the members of the Society in the space available. After the new policy has been carried out for a few months, further criticisms and suggestions will be welcomed. T. F. SLATTERY,

Chairman, Program and Educational Committee.

TENTATIVE SYSTEM

1. Prepare original abstracts as promptly as possible from current numbers, e. g.:
   Electrodepositors Tech. Soc.—E. B. SANIGAR.
2. *Oberflächentechnik* — W. R. MEYER.
   Zeit. Elektrochemie — W. R. MEYER.
3. *Galvano* — C. T. THOMAS.
4. *L 'Industria Meccanica* — F. D. ROSSINI.
5. *Metal Industry* (London) — W. BLUM.
   Ind. Eng. Chem.— W. BLUM.
   Chem. Met. Eng.— W. BLUM.
   Metals and Alloys — W. BLUM.
6. *Metal Industry* (New York) — T. F. SLATTERY.
   Brass World — T. F. SLATTERY.
   Metal Cleaning and Finishing — T. F. SLATTERY.
7. T. F. Slattery will check abstracts each month in *Chem. Abstracts*, also *Metals and Alloys*, and refer important articles to available persons, sending a copy of the journal if necessary.

Obtaining Bright Nickel Deposits in the Presence of Colloids. MARCEL BALLAY. *Comptes Rendus.* 199 — 60 — 1934.—Systematic study shows that, in many cases, the brightness of deposited nickel may be tied up with the existence of mineral or organic colloids in the cathode film. In the ordinary plating bath, the bright range which precedes that of burnt deposits, may be attributed to colloidal hydroxide or basic salts in the cathode film, formed at high pH. For a given current density and temperature in a sulfate bath, the brightness, as measured by readings of a photo-electric cell receiving a beam of light reflected from the plated surface, decreases with pH from the precipitation pH, passes a minimum at pH 5.0 to 5.5, and then increases. The addition of certain materials, as sodium sulfate, extends this bright range, probably by decreasing the tendency of the colloids to flocculate. Small amounts of cadmium in a sulfate bath cause very bright deposits at high pH

(about 6.8) and suitable current density. This may be due to basic colloids formed near the cathods. The deposit contains cadmium. For lower pH or current density, the deposit becomes streaked or contains black nodules. Lead sometimes acts in the same manner.

The addition of many organic colloids, such as starch, gum arabic, agar-agar, gelatine, egg white, casein, etc., results in uniformly bright deposits. Many others did not produce this effect due to instability or flocculation. The amount of colloid necessary varies with each kind and with the plating conditions. Solutions containing colloids which pre-exist in the bath, as the organic colloids, give more uniform results over a wide plating range, than do those in which the colloid forms in the cathode zone, such as with the mineral additions referred to. C. T. THOMAS.

Contribution to the Study of Nickel-plating upon Duralumin. E. DECARRIÈRE and A. HACHE. *Chimie et Industrie*, 595, **31**, 1934. (Special Number of April, 1934).—In a previous paper, the authors recommended the use of zinc or antimony as cemented and heat-treated coatings on duralumin in preparation for nickel plating as a protection against corrosion. The heat treatment causes intermetallic diffusion and results in very satisfactory adhesion of the nickel.

The following procedure is outlined:

A. For zinc, immerse in a solution of sodium zincate (28° Bé.) for 3 min. at room temperature, rinse, and dry. Heat for 24 hrs. at 150°C, pickel briefly in 10% Hcl., and plate either in a "neutral" bath containing 75g/l nickel ammonium sulfate, or in an "acid" bath containing 250 g/l nickel sulfate, 20 g/l nickel chloride, 20 g/l boric acid, at pH 5.3. With the acid bath, a final heat treatment at 150°C for 24 hrs. is necessary.

B. For antimony, brush with solution containing 20 g/l antimony trichloride, rinse, plate in the "acid" nickel bath, and then heat treat at 150°C for 24 hrs.

Excellent adhesion was obtained on test pieces 3 mm. (0.12 in.) thick, plated with 0.024 mm. (0.001 in.) of nickel. With antimony, using an alternate immersion test in sodium chloride solution (30 g/l), the corrosion resistance was triple that of pieces nickeled directly. The zinc treated pieces showed no improved resistance. The mechanical properties with antimony were found unchanged as compared with unplated duralumin, but they were somewhat weakened by the zinc procedure. Hence the treatment with antimony as outlined is recommended. C. T. THOMAS.

Rhenium Plating. COLIN G. FINK and P. DEREN. *Trans. Electrochemical Soc.* **66**, preprint 36, 1934.—Rhenium is a rare metal that was discovered in 1925. It is found in traces in ores of molybdenum and platinum and in copper slimes. It is possible to produce satisfactory bright deposits of rhenium from solutions of potassium perrhenate to which sulphuric or phosphoric acid has been added. Alkaline baths may also be used. The deposits are bright, and are harder than rhodium, but not as hard as chromium. W. BLUM.

Co-Deposition of Tungsten and Iron from Aqueous Solutions. M. LESLIE HOLT. *Trans. Electrochemical Soc.* **66**, preprint 13, 1934.—The authors found that it is practically impossible to deposit tungsten from solutions of pure sodium tungstate containing sodium carbonate, phosphate or

citrate. If, however, even a small amount of iron is present in the bath, a deposit is obtained which is an alloy of tungsten and iron containing 30 to 50 percent of iron. When all the iron is deposited from the bath, no more tungsten can be plated out unless iron (or some similar metal) is added to the bath. Deposits from tungsten baths containing nickel may include as much as 40 per cent of nickel. W. BLUM.

The Bullard-Dunn Electrochemical Metal Descaling Process. COLIN G. FINK and T. H. WILBUR. *Trans. Electrochemical Soc.* **66,** preprint 24, 1934.—This process depends upon cathodic pickling in acid that contains a salt of a metal such as lead or tin, which is deposited on the metal surface when the scale is removed. The efficiency is reduced by the presence of iron in the ferric condition. By using a high-silicon alloy, such as duriron, for the anode, the iron is kept in the ferrous condition, and is not detrimental. The deposit of tin or lead may be removed by reverse current in an alkaline solution. W. BLUM.

A Study of Diffusion on Copper Plated Zinc-Base Die Castings. WILHELM F. CASSELL. *Trans. Electrochemical Soc.* **66,** preprint 17, 1934.—Zinc-base die castings were plated with copper from a cyanide bath and then with nickel from a high pH nickel bath. When these were heated to a temperature of 450°F for 96 hours, the copper layer diffused into the zinc, forming three alloy layers that could be detected under the microscope. Examination of similarly plated die-castings that had been in service up to 1.5 years, showed that no appreciable diffusion had occurred, and that corrosion took place only where the coatings were thin or porous. The use of 0.0002 inch of copper and 0.00075 inch of nickel is recommended for die-castings. W. BLUM.

The Electrodeposition of Ternay Alloys of Cadmium, Zinc and Tin. LAWRENCE E. STOUT and BERNARD AGRUSS. *Trans. Electrochemical Soc.* **66,** preprint 30, 1934.—It is possible to deposit alloys of these three metals from solutions prepared by mixing typical cyanide solutions of zinc and cadmium and a sodium stannate tin plating solution. The composition of the deposits depends upon the composition of the bath, and the temperature and current density. The addition of tin to the zinc-cadmium alloy increased the protective value of the coating on steel in the salt spray test. W. BLUM.

Electrolytic Treatment of Zinc. JOSEPH SCHULEIN. *Trans. Electrochemical Soc.* **66,** preprint 31, 1934.—When zinc or zinc-coated steel is subjected to alternating current in a bath containing chromic acid and sulphuric acid (ratio of 100:1), the zinc becomes coated with a black film which increases its protection against corrosion in the salt spray. W. BLUM.

Non-poisonous plating baths. H. GOCKEL. *Zeitschrift für Elektrochemie,* Vol **40,** No. 6, page 302, June 1934.—In the production of galvanic deposits of Cu, Ag and Au poisonous cyanide baths are in general use. The proposed non-poisonous baths using lactates, tartrates and ethyl sulfate salts have not been able to replace the poisonous cyanide baths. The production of silver electro-deposits (on copper and brass) from thio-urea baths was carefully studied. The silver deposits on brass sheets were so ductile that the sheet could be wound around a 15 millimeter mandrel five times before the deposit exfoliated. Deposits from cyanide baths exfoliated after

two windings. The color of the buffed silver was much better in deposits from thio-urea baths than from cyanide baths. A suitable salt for galvanic thio-urea baths is the complex —

Ag Thi$_3$ NO$_3$ Thi — thio-urea

It is easily made by adding 25 to 30 g. of silver nitrate to a warm solution of thio-urea (30°-40°C) and diluting to one liter. The complex salt partly crystallizes out at room temperature and is more soluble in excess of thio urea solution than in water. The conditions of deposition are:—

Bath composition — Silver nitrate 25-30 g/l or 3.35 oz/gal.
Thio-urea 60-70 " "8 "
Bath temperature —30°C -35°C.
Bath voltage —1.5
Current density — .2 amp per decimeter or
1.86 amp per square foot.
Anodes of silver
Cathodes of copper or brass
Stirring facilities were used.

A possible disadvantage of the bath is the necessity of operating above 30°C (86°F) to prevent crystallization of the thio-urea-silver-nitrate salt. Its advantage is its non-poisonous nature. Thio-urea baths do not cost more than the cyanide baths. Complex thio-urea copper and gold baths were studied. Good gold deposits were obtained but the copper deposits were not completely satisfactory. Data on stability after long use, throwing power and cathode and anode efficiencies were not given. Your abstractor plans to investigate these baths and will report on completion.

WALTER R. MEYER.

Researches on the Behavior of Chromium Plated and Nitrided Gun Barrels. OSVALDO MACCHIA, L'Industria Meccanica, **16,** 180-182 and 267-269 (1934).—Heavy machine gun barrels (with a caliber of 6.6 mm or 0.26 inch) were plated on the interior with 0.0004 inch of nickel, followed by 0.0003 to 0.0004 inch of chromium. They were then subjected to the salt spray test for 30 hours to represent exposure to severe conditions. Another barrel was treated with ammonia to produce a nitrided surface.

One chromium plated, one nitrided and one untreated barrel were subjected to firing tests with 10,000 to 19,000 shots each and were examined at intervals to determine their condition. The extent of wear was judged by the distance that the "land" of the bullet (that is the point where the bullet entered the rifling) advanced from the breech of the gun. It was found that the three rifles behaved about the same, and it was concluded that neither chromium plating nor nitriding is of much value to increase the life of gun barrels. The favorable reports made by others on chromium-plated barrels are attributed to the fact that their tests were made on barrels that were plated and not subjected to corrosion prior to the tests. F. D. ROSSINI.

Bus Bars for Electrochemical Plants. L. C. PAN. Trans. Electrochem. Soc., **66,** preprint 7, 1934.—The most economical size of bus bars for a given rate of interest and depreciation, depends upon the cost, specific gravity, and resistivity of the metal, the cost of electric power (at the generator), and the annual number of hours of operation. The application of these principles is illustrated by a calculation of the most economical current density for bus bars

of aluminum and of copper. At present prices of these two metals in bar form, and assumed values for the other factors, these current densities are 295 amp/sq. in. for aluminum, and 437 amp/sq. in. for copper. It is concluded that aluminum can be used economically only if its cost per pound is less than 2.22 times that of copper. W. BLUM.

Adhesion fo Electrolytic Copper Deposits. PIERRE JACQUET. Trans. Electrochemical Soc., **66**, preprint 28, 1934.—The method used for testing the adhesion of copper to an underlying nickel coating depends upon first treating part of the cleaned nickel surface with a dilute solution of a colloid such as peptone. This permits the copper on that part to be easily detached and to serve as a "handle" to pull off the more adherent part of the deposit by applying weights to a lever. The weight required is taken as the measure of adhesion.

The results on numerous deposits showed that on electrolysis and "aging" of an acid copper solution, the adhesion of the deposit changes. Measurements of the contraction of a nickel cathode during deposition of the copper showed that an increase in contraction resulted in a decreased adhesion. Better adhesion of copper was observed on polished than on rough nickel surfaces.

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LOS ANGELES BRANCH

Minutes of the regular monthly meeting of the Los Angeles Branch was held September 12th, 1934, at the Rosslyn Hotel. President M. D. Rynkofs presided. Minutes and financial report of the June meeting were read. Mr. Frank Rushton suggested that the answers to questions from the question box as read in the minutes were too indefinite and that they be made more explicit. With this correction the minutes were accepted. Bills for per capita tax, secretary's fee, printing and stamps were read and ordered paid.

One of our members, Mr. Spence, who had just returned from a trip to Wisconsin and Illinois told us of his trip. He told us that business conditions there seemed to be much improved. He said that nearly everyone was working and that on the whole that part of the country was better off than California.

It was suggested that the best wishes of the Branch be extended to Alex. Regmunt who has been sick for some time.

An application from Wm. J. Blanch of Australia was read. The Branch voted to accept him as an associate member of the Los Angeles Branch.

George W. Kyle resigned and Chas. Waugh was suspended.

The meeting was turned over to the Librarian. The following questions were in the question box:

Q. What is the effect of too much or too little copper sulphate in an acid copper solution?

A. A solution containing too much copper in proportion to the amount of acid will plate bright on the edges and dark in the center. Too little metal will cause the solution to plate slowly and burn on the edges.

Q. Can die castings be plated successfully in a regular nickel solution?

A. Yes, but it is advisable to use a die cast solution.

Q. How can a crystalline effect be obtained on aluminum or Dural?

A. Dip in caustic soda solution and then bright dip. This will only work on castings. Sheet aluminum does not give a good crystalline finish.

Q. Can an alloy of lead antimony and tin be cleaned without the use of gasoline?

A. Yes. There are several good cleaners on the market that will do this work much better than gasoline. The cleaner should be selected for the particular alloy to be cleaned.

Q. Give formula for hard chrome direct on steel for punch and die work.

A. 1 lb. chromic acid, 1/200 lb. sulphuric acid to one gal. water. Use at 160 to 175 degrees Fahrenheit. Current pressure 3 1/2 to 4 volts.

At the close of the question box discussion the meeting was turned over to Mr. Boeck who has just returned from a trip to Northern Africa and Southern Europe. He showed us several reels of motion pictures that he took and gave us a most interesting talk about conditions over there. He says he has several more reels yet to show us so we are all looking forward to his next meeting with us.

BOSTON BRANCH

Boston Branch met Thursday the 4th at the American House with Presi-

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dent Campbell in the chair. Minutes of the previous meeting read and approved.

Communications from the chairman of the membership drive brought on a discussion that resulted in a motion being made that the Board of Managers act as a committee to meet a week after each meeting to arrange a program for the coming meeting to bring new members to the Branch and also to interest the members to attend the meetings.

The Branch has only had three members on the Board of Managers so a motion was made to make it a Board of five members. Ed C. De Lorme and Harry C. Lack were elected. This will or should put the Branch on top.

The application of Joseph F. Burrows, South Hampton Rd., Amesbury, Mass., was received for membership. A discussion on different questions was held for about one hour when the meeting adjourned at 10:30 P.M.

A. W. GARRETT, *Secy.*

NEW YORK BRANCH

A regular meeting of New York Branch was held on September 28, which could well be called "old timer's" night. Most of those present were members we don't see so often.

A very interesting and educational discussion was had on the thickness of chromium plate and the speed of deposition.

Several members had difficult problems to solve, relative to methods of plating bulky jobs. These were presented to the body for discussion and some very good suggestions were brought forth.

The members were glad to hear that Mr. Martin B. Apy, an old time member, is on the road to recovery, after a prolonged illness.

The first meeting of the month was held on October 12, and considering that it fell on a holiday, the attendance was very good.

A subject that proved very interesting was as to the side of the generator it is best to have the rheostat for the control of the current. There was a great difference of opinion. Some said it is best to control the cathode current, others said the anode side and still others said it made little or no difference.

The branch and members were shocked to hear of the sudden death of Mrs. Proctor, beloved wife of Mr. Charles Proctor, our founder. A minute's silence was motioned for the repose of the soul of Mrs. Proctor.

New York Branch joins with the Society and industry in general in offering to Mr. Proctor and his family whole-hearted sympathy in the loss of a devoted wife and mother.

ARTHUR WALLACE, *Rec.-Sec.*

DETROIT BRANCH

A regular meeting of the Detroit Branch was held on October 5th, at 8:00 P.M., at Hotel Statler, J. H. Hansjosten, President, in the chair.

A goodly attendance was present. In fact, there were approximately fifty people present. The minutes of the previous meeting were read and approved.

The following list of applications was read and referred to the Board of Managers for action:

ACTIVE:

Lawrence W Rowley, 6320 E. Fort
Leo Paul, 3286 E. Fort Street
G. W. Collins, 590 Parkview Ave.
Ray Austin, 1483 Montclair Ave.
Robert L. Reed, 2567 Parker Ave.

ASSOCIATE:

J. D. Clayton, 2842 W. Grand Ave.
Delos R. Hay, 3019 Harding Street

L. P. Brockway was reinstated to active membership.

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The Secretary was instructed to write a letter of condolence to the widow and family of the late Chas. Cunningham, who died Oct. 1, 1934.

Gustav Soderberg, of the Udylite Co. gave quite an interesting talk and illustration on the blackboard of the Construction of a Rheostat such as is used in the plating room. He went into it quite deeply and there was quite a lot of algebra connected with the illustrations on the blackboard. He was listened to quite attentively, and after his talk, there were a lot of questions asked, among which was an especially comical one:—If when ordering one of these rheostats, the party is also furnished with a book on algebra? However, taken altogether, the talk was a very instructive one and we believe that if a rheostat is constructed along these lines, which no doubt will be in the near future, it will be a boon to the plater.

W. W. Phillips, of the General Motors Corp., also Chairman of our Research Committee, has just returned from attending a meeting in Washington at the Bureau of Standards. He reports that the new specifications on plating will soon be forthcoming from the Bureau and will be generally adopted in the manufacturing line. He reported a very interesting meeting.

T. C. EICHSTAEDT, *Secy.-Treas.*

CHICAGO BRANCH

The regular monthly meeting of Chicago Branch was held Oct. 13, at the Atlantic Hotel. President E. G. Stenberg presiding and all other officers present. Mr. O. E. Servis, Mr. C. Tompkins, Mr. F. J. Hanlon were appointed as a condolence committee to extend Chicago Branch's sympathy to the H. E. Willmore family.

It was agreed that Chicago Branch was to have a banquet this year and a committee was appointed on same.

Mr. Emery, Professor of chemistry, spoke about the Fall class now forming for this year's chemistry and all members wishing to join should get in touch with Mr. Emery as soon as possible.

There was assembled about 125 members and visitors to hear Mr. W. M. Phillips of the General Motors Corporation ably assisted by Messrs. Wirshing and Clifton, showing slides of plating solutions in operation by special microscopic lenses and plating baths in special tanks constructed for that purpose in their laboratory and to the many platers in attendance, who could not attend the Detroit Convention, this talk and demonstration was quite a revelation and well received.

Mr. Phillips was besieged with questions relative to the methods practiced to get these solutions to photograph on the screen and which Bill in his very amiable way explained to the boys.

It was one of those meetings long to be remembered and one of the many interesting meetings promised this Fall and Winter by our Past President and Librarian O. E. Servis, who is to be congratulated in getting Mr. Phillips and his associates to put on this demonstration and Chicago Branch sure wants to thank General Motors Corporation for the privilege of being able to hear Mr. Phillips give this talk again at this time.

Milwaukee as usual had a delegation of about 10 people headed by the Mayor of the branch, Dan Wittig, and Messrs. Williams of the S. K. Williams Co., and we were glad to see them.

The Chicago members turned out in force and a response like this, surely gladdens the heart of the officers and

spurs them to greater efforts to make the educational part of the meetings more interesting. After the meeting the Branch Officers were host to a refreshment party and the meeting closed at 11:00 P.M. with everybody happy.

The many friends of Mr. C. Stiers throughout the Society will be sorry to hear that Charlie is ill at the Jackson Park Hospital, with a perforated appendix.

J. W. HANLON, *Secretary.*

TORONTO BRANCH

The attendance at our October meeting was a truly convincing evidence of increasing interest. One hundred per cent increase over attendance at any meeting during the previous year.

Two applications for active membership were read and some very promising prospects are being encouraged to get their names enrolled.

President Acheson is surely stirring things up and a splendid winter series of attractive programs is assured. Mr. E. W. Skelton, chemist in charge of electroplating at The Coulter Copper & Brass works, Toronto, gave us an eloquent talk on the following subjects:

(a) "Advantages of Scientific Control."

(b) "Recent Advances in Plating Technique."

(c) "A description of Anodizing and Coloring Aluminum."

Mr. Skelton possesses practical knowledge of plating and illustrated his talk with various specimens, instruments, etc.

Ernie Coles thought Mr. Skelton's talk should be given before an assembly of employers. It might improve their respect for an intelligent plater.

Members of Toronto Branch are advised to attend meetings and reap the benefits.

HARTFORD BRANCH

The Hartford Branch held its first fall meeting on Monday evening, Sept. 24, 1934, at the Hartford Trade School, Hartford, Conn.

The meeting was called to order at 8:15 P.M. with President St. Pierre in the chair. Minutes of the previous meeting were read and accepted. One communication was read and placed on file. No bills were presented.

Under new business, it was voted to put on a campaign for new members, as well as the reinstatement of those suspended. One associate member was reinstated at this meeting. Two applicants were elected to membership. These were as follows:

Mr. Henry B. Smith, associate, of the R. Wallace & Sons' Mfg. Co., of Wallingford, Conn., and Mr. Alexander Christie of Veeder Root Co., of Bristol, Conn., active.

One application for active membership, by Mr. W. H. Lamie, of the New Departure Mfg. Co., of Bristol, Conn., was voted on for publication.

It was also voted to hold a question box at each of our regular meetings in the future.

At this meeting, Mr. H. R. Mac Fadyen of the Hartford Branch, gave a very interesting paper on "Foremanship." His paper brought forth many comments and questions. In conclusion he was given a rising vote of thanks.

The meeting was attended by eighteen members, and was adjourned at 10:30 P.M.

The Hartford Branch held its regular monthly meeting on Monday evening, October 22, 1934, at the Bristol Boy's Club, 105 Laurel St., Bristol, Conn. The meeting was called to order at 8.30 P. M, with President St. Pierre in the chair. Minutes of the previous meeting were read and accepted. No

bills or communications were presented. One applicant, Mr. W. H. Lamie of Bristol, Conn. was elected to active membership. The application of Mr. Jos. W. Backus of Hartford was voted on for publication.

Mr. Lester Laming, Chief Metallurgist of the New Departure Mfg. Co., of Bristol, was speaker for the evening. He gave a very interesting lecture, accompanied by many lantern slides of the manufacture and treatment of various kinds of steels commonly used in the automotive work. In conclusion he was given a rising vote of thanks.

It was voted to hold our next meeting in Hartford, and to invite the steel treaters, as well as the Waterbury, Bridgeport and Springfield Branches to attend. Mr. Geo. B. Hogaboom will be the speaker for the evening.

After the business meeting was over, a very delicious lunch was served and thoroughly enjoyed.

The meeting was adjourned at 11:00 P. M. V. E. GRANT, *Secretary*.

WATERBURY BRANCH

The regular monthly meeting of Waterbury Branch was held Friday evening, October 12th, in Engineers' Hall. President Tennant Elwin presided. Routine business was transacted after which it was announced that the speaker scheduled for the evening would be unable to be present, but would favor at a later date. The lecturer then taking charge of the meeting, several interesting subjects were discussed with the following two hours passing swiftly. A large percentage of the membership were present as were visitors from Meriden. The next meeting will take place Friday evening, November 9th. Many of the local members visited the local manufacturers' display at the Wonder Show, held in the Armory, and were much interested in same. The many novelties and finishes proved quite an attraction. Charles B. Jacobs, a man well known to the metal industry and A. E. S. members throughout the country, died in the Waterbury Hospital, October 18th. During his career he was associated with Charles Steinmetz and with such concerns as the General Electric Co. and Dupont Co. Of late he has been doing special experimental work for the American Brass Co. of this city. Mr. Jacobs was the inventor of "Alumdum" and "Evadmo" for which he received the John Scott medal from the Franklin Institute of Philadelphia.

W. K. GUILFOILE, *Secretary*.

MILWAUKEE BRANCH

The regular meeting of Milwaukee Branch was held at Lipp's Hall, Thursday evening, October 11, 1934. Due to the absence of the President, Pat Sheehan, and Vice-President, Dexter Rhodes, the members present elected Dan Wittig to act as President for the evening. Mr. Henry Bornitzke, 2602 N. 50th St., Milwaukee, Wis., was accepted as an active member of Milwaukee Branch. Mr. Al Hermansen showed the boys some samples of bright nickel plating. We are having good attendance at our meetings.

FRANK J. MARX, *Secy.-Treas.*

NEWARK BRANCH

The regular meeting of the Newark Branch was held at the Newark Elks Club. After the regular business had been transacted and the meeting turned over by President Samuel Taylor to our Librarian Mr. Nelson Sievering, who introduced the speaker of the evening, Dr. R. M. Burns, of the Bell Telephone Laboratories, New York, who had for his subject "Why, How and at What Rate Metals Corrode."

Dr. Burns' talk, with the help of

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innumerable lantern slides, showed how corrosion starts and how it multiplies in each stage of corrosion with certain metals, and how some metals with the help of chromates can withstand corrosion. After many questions were asked by members a rising vote of thanks was extended to Dr. Burns. It was Dr. Burns' first visit and talk that he gave before Newark Branch, but we hope to have him with us again in the near future.

GEORGE REUTER, *Sec.*

BRIDGEPORT BRANCH

The Annual Outing of the Bridgeport Branch was held on Saturday, September 8, at the Jockey Club in Devon, Conn. In spite of rain the affair was a most successful one. There were fifty present including members and their wives. The affair commenced at eleven in the morning and continued until midnight.

Great credit is due to Bill Stratton, Ben Kusterer, Eugene Phillips, Al Rosenthal, and Joe Sterling for the huge feed they handed out. The Branch also extends its thanks to George Karl of Maas & Waldstein, who provided music and entertainment.

The regular monthly meeting of the Bridgeport Branch was held in the Chamber of Commerce rooms of the Stratfield Hotel, on Friday, October 5, at eight o'clock. There were thirty members present. Al Rosenthal, President, presided. The Roll Call of the Officers and the minutes of the last meeting were read and accepted.

Joe Sterling, Chairman of the Outing Committee reported on the Annual Outing held in September. He was tendered a vote of thanks for the effort he put into the affair to make it successful.

Ray O'Connor, Chairman of the Convention Committee, announced

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there would be a meeting of this committee on October 13, in the Hotel Garde, New Haven. John Oberender urged the various branches for their cooperation in carrying out the details of the convention. Tom Chamberlain, Secretary of the Convention Committee, will have charge of all communications pertaining to the affair.

The Chair was turned over by Al Rosenthal to George Wagstaff, who presented Mr. Meyers, the speaker of the evening. Mr. Meyers had a very interesting paper prepared on "The Use of Electric Current in Pickling and Plating Solutions." After reading his paper, many questions were asked Mr. Meyer and the answers fully discussed. Similar educational sessions will be conducted at the future meetings. Mr. Meyer's paper appears in this issue.

A prize donated by Mr. John English of the J. B. Ford Company, to increase the membership at the meetings, was won by Mr. Barry of New Haven.

WM. FLAHERTY, *Sec'y.*

ST. LOUIS BRANCH

The regular meeting that was postponed from October 12, on account of the death of Mr. H. J. Richards' wife, was held on Friday, October 19,1934.

The minutes of previous meeting were read and approved. Roll call of Officers showed two absent. St. Louis Branch is still boosting the membership drive, and is trying to get in personal contact with each former member, and urging them to join. We hope to have some success.

St. Louis Branch extends its sympathy to Mr. H. J. Richards, on the loss of his dear wife, who passed away two weeks ago.

CHARLES T. MCGINLEY, *Sec'y.*

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MEMBERSHIP REPORT

APPLICATIONS

Arthur Joseph Turcott, 192 W. Brittania St., Taunton, Mass., Active — Providence-Attleboro Branch

H. Robert Schoenfeldt, 415 South 5th St., Harrison, N. J., Associate — Newark

A. Raml, 2427 N. Francisco Ave., Chicago, Ill., Active — Chicago

Lawrence C. Rowley, 6320 N. Fort St., Detroit, Mich., Active — Detroit

J. S. Clayton, 2842 West Grand Blvd., Detroit, Mich., Active — Detroit

Robt. L. Reed, 2867 Parker Ave., Detroit, Mich., Active — Detroit

Leo Paul, 3286 N. Fort St., Detroit, Mich., Active — Detroit

Ray Austin, 1483 Montclair Ave., Detroit, Mich., Active — Detroit

G. C. Collins, 590 Parkview Ave., Detroit, Mich., Active — Detroit

Delos R. Hay, 3019 Harding St., Detroit, Mich., Associate — Detroit

Joseph F. Burrows, South Hampton Rd., Amesbury, Mass., Active — Boston

ELECTIONS

Alexander Christie, 6 Archaid St., Bristol, Conn., Active — Hartford

Henry B. Smith, c/o R. Wallace & Sons Co., Wallingford, Conn., Active — Hartford

William John Blanch, 45 Mall St., Auburn, New South Wales, Australia, Associate — Los Angeles

P. Goring, 155 Roseberry Ave., London, E. C. I., England, Associate — Chicago

W. Thomson, c/o Woodstock Typewriter Co., Woodstock, Ill., Active — Chicago

R. J. Costello, 1901 W. Erie St., Chicago, Ill., Active — Chicago

Henry Bornitzke, 2602 N. 50th St., Milwaukee, Wis., Active — Milwaukee

John Adam Bauer, Hanson Van Winkle-Munning Co., The Bourse, Philadelphia, Pa., Associate — Philadelphia

Herbert J. Perry, 242 Henley Road, West Park Station, Philadelphia, Associate — Philadelphia

REINSTATED

H. S. Brockway, 704 Sheridan Ave., Detroit, Mich., Active — Detroit

Edw. H. Christ, P. O. Box 241, New Britain, Conn., Associate — Hartford

DIED

Chas. W. Cunningham, 7347 Pinehurst Ave., Dearborn, Mich., Active — Detroit

RESIGNED

George W. Kyle, 311 7½ West 2nd St., Los Angeles, Cal., Active — Los Angeles

Equipment Exhibit

at the Bridgeport Convention

IN the last few years there has been a rather feeble attempt on the part of equipment manufacturers to exhibit their goods at the A.E.S. conventions.

Many platers interested in the newest developments in mechanical polishing and plating, wonder why we cannot have a display similar to that held in connection with the recent steel show in New York City.

Mr. N. Ransohoff manufacturer of industrial machines in Cincinnati, Ohio, makes the following suggestions in a letter to the Editor dated, October 12, 1934.

> It would appear to me feasible to have an exhibit in connection with your Platers' Convention in Bridgeport next spring. It would not have to be as elaborate as the Steel Show would be, but it might be possible simply to rent a portion of an unused factory building near the center of town and sublet the space to manufacturers so they could show their latest equipment. It should not be much more expensive to bring power into the building so the machines could be shown in operation, since none of the equipment would require much power. Furthermore, if the show is in the spring, heating would not present a problem.
>
> Yours very truly,
> N. RANSOHOFF, INC.

This suggestion has been presented to the Bridgeport Convention Committee, who have had an exhibit similar to Mr. Ransohoff's plan in mind. A definite decision regarding this will be made in the near future and will be printed in the Review.

It is earnestly hoped that a real display may be produced at the next Convention, and that a desirable location may be found, other than hotel rooms which are in most cases so crowded and separated that the real effect is lost.

Those attending the conventions have plenty of spare time between sessions to appreciate an equipment exhibit and without doubt the Bridgeport Committee will if at all possible provide a creditable display in line with the idea suggested.

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Fellow Members:

The A. E. S. is composed of 25 Branches.

If each Branch would add 25 members to its roll it would mean 625 new members.

So let's all start a friendly contest in the membership drive.

All right — Let's go — but don't forget to send in your report monthly.

Secretaries Please Note

There are a number of members of the A. E. S. who are not receiving THE MONTHLY REVIEW owing to a change of address and the neglect in notifying the Editor as to their new address.

Quite a few copies are returned each month marked "Unclaimed" or "Not at". The names on these copies are immediately taken out of our mailing list.

When you send a new address, please give the old address also. This is important.

The BUYERS' GUIDE

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American Brass Co., Waterbury, Conn.

Anodes, Acids and Salts

Hanson-Van Winkle-Munning Co., Matawan, N. J.

Chas. F. Hommedieu & Sons Co., 4521 Ogden Ave., Chicago, Ill.

The Harshaw Chemical Co., Cleveland and large cities.

Grasselli Chemical Co., Cleveland, O.

Ball Anodes

Udylite Process Co., 3939 Bellevue Ave., Detroit, Mich.

Grasselli Chemical Co., Cleveland, O.

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Lea Mfg. Co., Waterbury, Conn.

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Matchless Metal Polish Co., Glen Ridge, N. J. and Chicago, Ill.

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United Chromium Inc., 51 E. 42nd St., New York, N. Y.

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Grasselli Chemical Co., Cleveland, O.

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BRANCH DIRECTORY

ANDERSON

Meets first Monday of every month at 7.30 p. m. at the Anderson, Indiana, Y.M.C.A. Secretary, Fred Carl, 216 W. 14th St., Anderson, Indiana.

BALTIMORE-WASHINGTON

Meets at Bureau of Standards, Washington D. C., the first Saturday of each month. Secretary, Irvin H. Hahn, 207 S. Sharp St., Baltimore, Maryland.

BOSTON

Meets at American House, Boston, Mass., first Thursday each month. Secretary, A. W. Garrett, 100 King St., Dorchester, Mass.

BRIDGEPORT

Meets first and third Fridays of each month at Chamber of Commerce Rooms, Stratfield Hotel, Secretary-Treasurer, Wm. H. Flaherty, 691 Maplewood Ave., Bridgeport, Conn.

CHICAGO

Meets second Saturday of each month, at 8 p. m., Atlantic Hotel, 316 S. Clark St., Secretary, James Hanlon, 3004 N. Whipple St., Chicago, Illinois.

CINCINNATI

Meets every Thursday, 7.30 p. m., at Vocational Training School, Spring and Liberty Sts. Secretary, Al. Yeager, 2021 Sherman Ave., Norwood, Ohio.

CLEVELAND

Meets first Saturday of each month at Carter Hotel, Secretary, Wm. E. O'Berg, 2191 W. 29th St., Cleveland, Ohio.

DAYTON

Meets first Saturday of each month at the Y.M.C.A., Dayton, Ohio. Secretary, Ward Protsman, 141 Westwood Ave., Dayton, Ohio.

DETROIT

Meets the first Friday of each month at the Hotel Statler, T. C. Eichstaedt, Secretary. 81 77 Pingree Ave., Detroit, Mich.

GRAND RAPIDS

Meets second Thursday of each month, 7.30 p. m., at Cody Hotel, 1 Division Ave., South. Secretary, Chas. S. Whalley, 931 Pine Ave., N. W., Grand Rapids, Mich.

HARTFORD-CONNECTICUT VALLEY

Meets fourth Monday in each month alternately at the Chamber of Commerce, 815 Main St., Hartford, and the Chamber of Commerce, 134 Chestnut St., Springfield. Secretary, Vernon Grant, 32 Jennings Road, Bristol, Conn.

LOS ANGELES

Meets second Wednesday of each month at 6.30 p. m., at the Rosslyn Hotel, 2nd floor, N.W. Cor. of 5th and Main Sts. Secretary, Earl Coffin, 2910 S. San Pedro St., Los Angeles.

MILWAUKEE

Meets second Thursday of each month at Cor. 3rd and Highland Ave. Secretary, Frank J. Marx, 1431 W. Cherry St., Milwaukee, Wis.

MONTREAL

Meets second and fourth Friday of each month, at 1437 Aylmer St., Montreal, Quebec, Canada. where the Secretary-Treasurer, Mr. Charles Doherty, can be found at any time.

NEWARK

Meets first and third Fridays of each month, at Newark Elk's Club, Broad St., Newark, N. J., at 8 p. m. Secretary-Treasurer, Geo. Reuter., 784 Prospect St., Maplewood, N. J.

NEW YORK

Meets second and fourth Fridays of each Month, in the World Building, Park Row, New York City, N. Y. Secretary-Treasurer, Frank MacStoker, 25 Princeton St., Garden City, L. I., N. Y.

PHILADELPHIA

Meets third Friday of each month, in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Sts. Secretary, J. E. Underwood, 327 N. 10th St., Camden, N. J.

PITTSBURGH

Meets first Friday of each month, at 8 p. m. at Keystone Club. Secretary, S. E. Hedden, 227 Fifth St., Aspinwall, Pa.

PROVIDENCE-ATTLEBORO

Meets first and third week of each month. Notice by card. Secretary, J. H. Andrews, 19 Rosedale St., Providence, R. I.

ROCHESTER

Meets third Friday of each month, at Hotel Seneca, Secretary, J. R. Elster, 295 Rawlinson Road, Rochester, New York.

SAN FRANCISCO

Meets at Plaza Hotel, San Franciso. Secretary, H. W. McKibben, 310 Tehama St., San Francisco, Cal.

ST. LOUIS

Meets second Frday of each month, at the Plant of the Lassalco Co., 2828 LaSalle St. Secretary, C. T. McGinley, 8214 Fairham Ave., University City, Mo.

TOLEDO

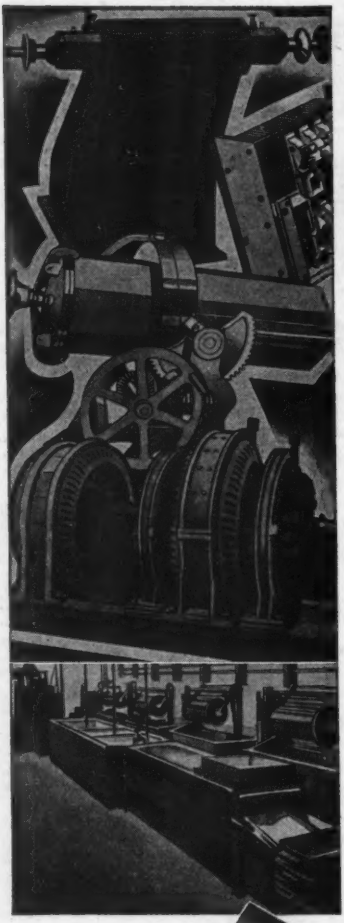
Meets first Thursday of each month, at Toledo Secor Hotel, Cherry and Page Sts., Secretary, W. W. Welker, 2228 Middlesex, Toledo, Ohio.

TORONTO

Meets fourth Monday of each month, at Canadian Foresters' Hall, 22 College St., Room No. 2. Secretary, H. W. Graham, 26 Beatrice St., Toronto, Ontario, Canada.

WATERBURY

Meets second Friday of the month, at Engineers Hall, No. 11 East Main St. Secretary, Wm. F. Guilfoile, 14 Oakland Ave., Waterbury, Conn.



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